

SKYWAYS

ia's Newest Illinois U Library
Fighter: La 17

page 10

Proving Ground
High-Speed Planes
page 14



CHICAGO ILL ILL
NAVY PIER
CHICAGO UNDERGRADUATE
UNIVERSITY OF ILL LIBRARY
12-5
205



MORE LIFT FOR NAVY

● World famous work horse of the sky, the Douglas DC-3 is now starting a new career in the Navy under a new name and with a new look. Completely modernized and known commercially as the Super DC-3, new fleets of 100 of these rugged transports will add greatly to the Navy's air lift under the designation: R4D-8.

With new swept-back wings, more power, greater speed, longer range and increased payload, the R4D-8 represents real economy.

At a fraction of the cost of a fleet of new transports, the U. S. will get a proved airplane that presents no new problems in personnel training, maintenance or parts supply.

Whether the need is for modernizing a well-proved design, or providing entirely new speed-of-sound aircraft for our defense, Douglas can meet the challenge with its 30 years of experience and the trained-skills of long-time employees. Douglas Aircraft Company, Inc.

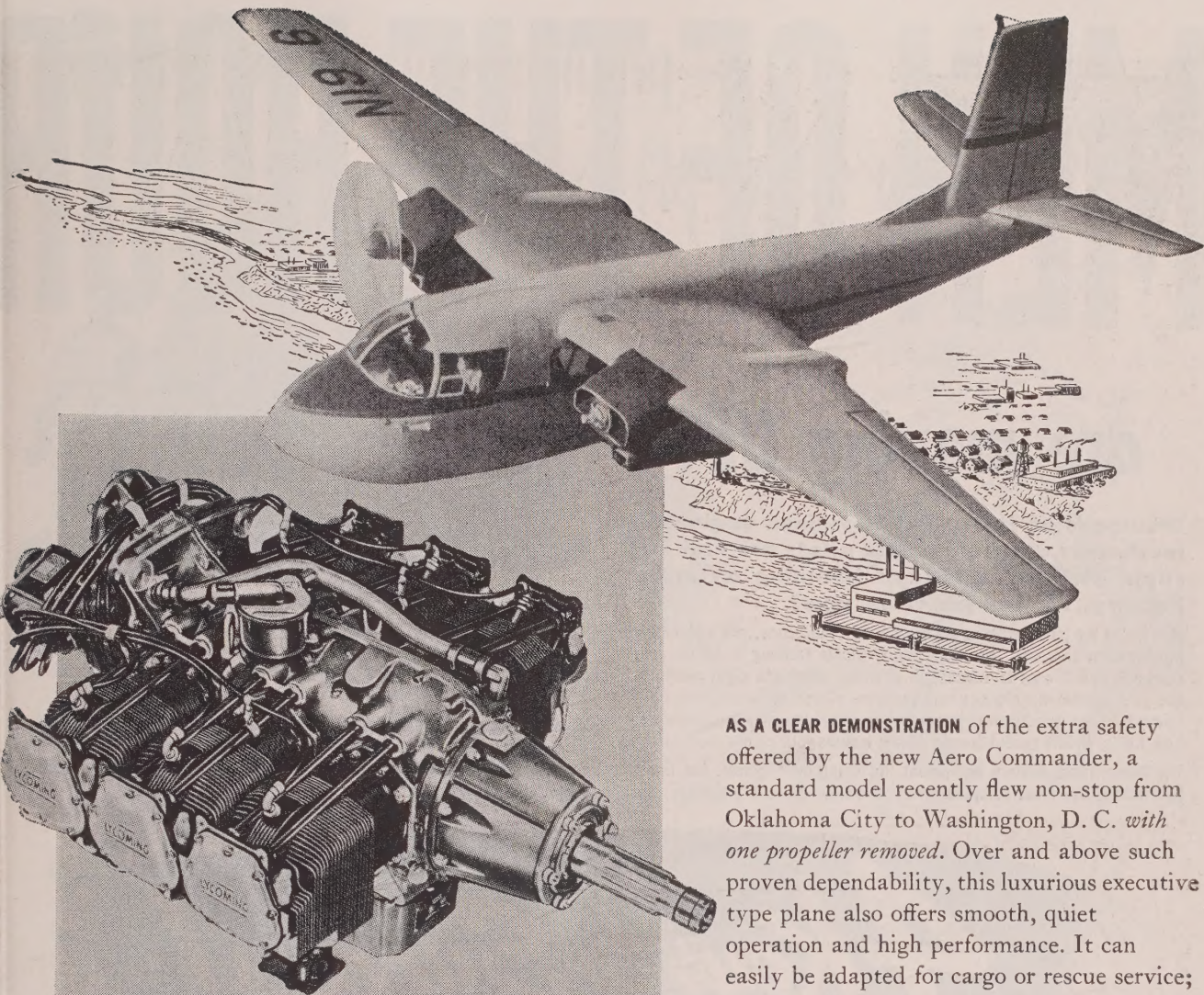
Depend on

DOUGLAS



*Skilled engineers and technicians
find Douglas a good place to work!*

WORLD'S LARGEST BUILDER OF AIRCRAFT FOR 30 YEARS ➤ MILITARY AND COMMERCIAL TRANSPORTS
FIGHTERS ➤ ATTACK PLANES ➤ BOMBERS ➤ GUIDED MISSILES ➤ ELECTRONIC EQUIPMENT ➤ RESEARCH



LYCOMING'S DEPENDABLE POWER

*puts extra safety
in the*
AERO COMMANDER!

AS A CLEAR DEMONSTRATION of the extra safety offered by the new Aero Commander, a standard model recently flew non-stop from Oklahoma City to Washington, D. C. *with one propeller removed.* Over and above such proven dependability, this luxurious executive type plane also offers smooth, quiet operation and high performance. It can easily be adapted for cargo or rescue service; equipped for land, snow, or water.

A MULTITUDE OF RIGOROUS FLIGHT TESTS have proven the extra dependability of Lycoming engines under the toughest operating conditions. The twin Lycoming GO-435-C2 engines in the Aero Commander are equipped with gear reduction—the same as that used in big commercial planes. The result is greater engine and propeller efficiency, making possible longer, more comfortable flights at lower cost. You can be sure of your plane when it's . . .

POWERED

BY LYCOMING



LYCOMING-SPENCER

WILLIAMSPORT • PENNSYLVANIA

DIVISION



AIRCRAFT ENGINES AND RELATED PRODUCTS • AIR-COOLED INDUSTRIAL ENGINES AND RELATED PRODUCTS
PRECISION MACHINE PARTS • RESIDENTIAL AND COMMERCIAL BOILERS • STEEL PLATE FABRICATION • GRAY IRON CASTINGS

MEN OF THE HOUR



are moving UP!

Thousands of Embry-Riddle trained engineers, mechanics, specialists and pilots are making rapid strides in today's booming aviation industry. You can join them, now!

Men in the top jobs now, who are moving up...up...up...are undeniably proving that thorough, practical Embry-Riddle training is by far your quickest, surest road to success in aviation. Complete eight-month to two-year Embry-Riddle courses in every phase of aeronautics are tailored to the practical and exacting aviation industry requirements. Your Embry-Riddle graduation certificate insures your career opportunity. The latest, most modern equipment (including jet engines), the finest instructors, the most complete aviation school campus anywhere, are



all yours at Embry-Riddle. You learn fast and well, working with live aircraft in vast shops and hangars.

If military service interrupts your studies, you're still a long way ahead of the crowd. During World War II, more than 30,000 pilots, technicians and mechanics of the air forces were Embry-Riddle trained!

If you are now a high school student, a graduate or a veteran, investigate at once the full advantages and tremendous career security of Embry-Riddle training. Join the Embry-Riddle Men of the Hour. Write for full information today.

4 Keys to Success!



AIRCRAFT & ENGINE MECHANICS

Vast numbers of properly trained A&E Mechanics are urgently needed. Our C.A.A.-approved school with a quarter-century experience assures your quickest advancement. Embry-Riddle students learn fast with modern equipment, including jet... live aircraft, airline-size hangars.



AERONAUTICAL DESIGN AND TECHNOLOGY

Embry-Riddle's accelerated 26-mo. Aeronautical Design and Technology Course provides finest training available. Technicians with management responsibility enjoy highest salaries!



A&E COMBINED WITH COMMERCIAL

Airmen with dual pilot-engineering ability are needed by aviation companies and operators. Embry-Riddle combination training offers you the most in your aviation career.



COMMERCIAL PILOT

Embry-Riddle trained pilots benefit from our years of experience with 30,000 students... the best instructors, up-to-date aircraft, superb year-round flying weather. Also Instrument and Instructor's ratings.

CLASSES BEGINNING NOW -- SEND COUPON TODAY!

Dean of Enrollments -- Dept 93
Embry-Riddle School of Aviation
MIAMI 30, FLORIDA
Please Print

NAME _____

ADDRESS _____

City _____

State _____ Age _____

I am interested in...

- ☐ A.&E. Mechanic
- ☐ Commercial Pilot
- ☐ Aeronautical Design and Technology
- ☐ A.&E. Combined with Commercial Pilot
- ☐ Flying Mechanic

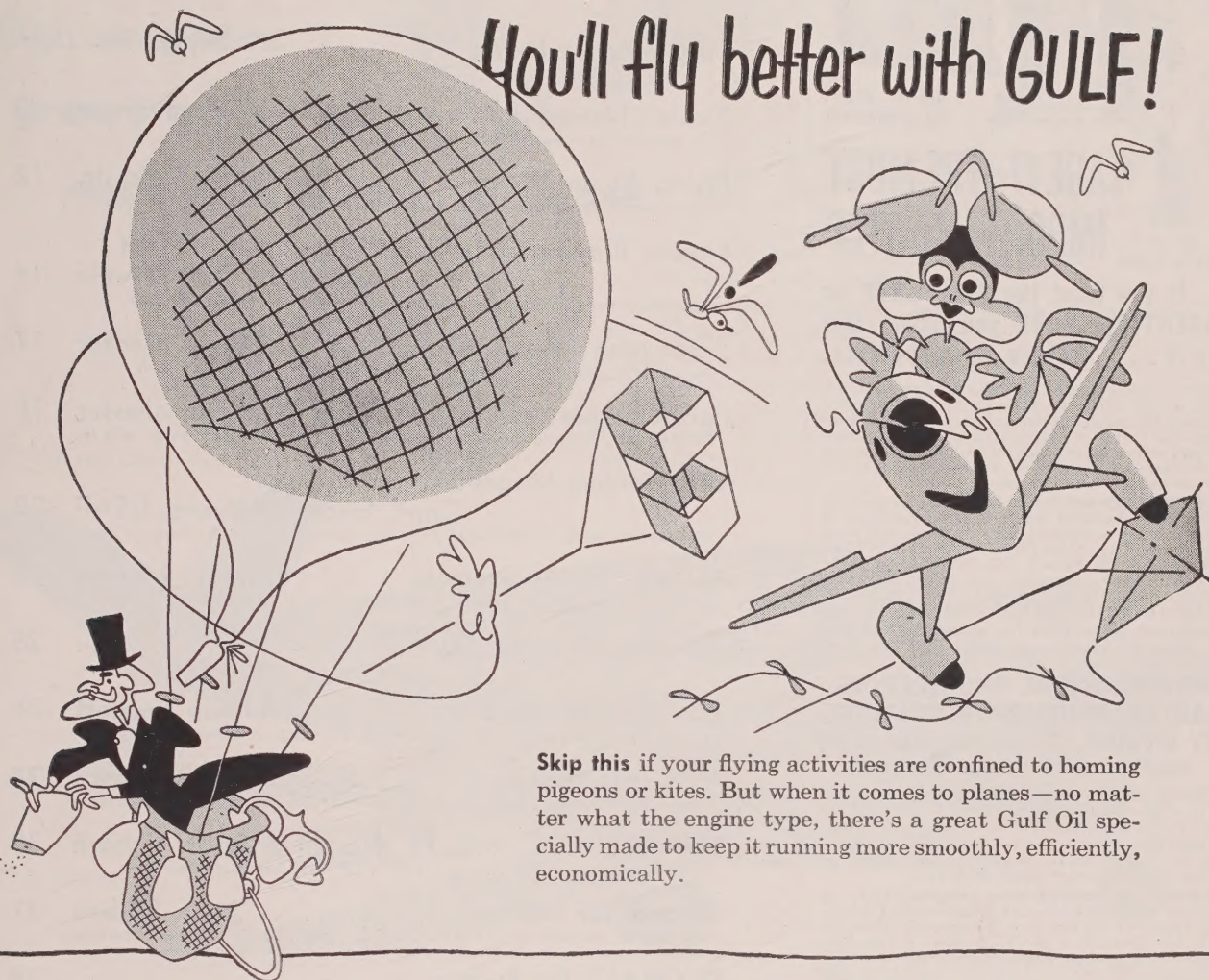
Check One ☐ Veteran ☐ Non-Veteran



TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

If it's a plane you're flying—

You'll fly better with GULF!



Skip this if your flying activities are confined to homing pigeons or kites. But when it comes to planes—no matter what the engine type, there's a great Gulf Oil specially made to keep it running more smoothly, efficiently, economically.

Gulfpride Aviation Oil—Series D for Horizontally Opposed Engines!



It's the world's finest detergent dispersant aviation oil, the only one put through Gulf's exclusive Alchlor process to remove extra carbon-and-sludge-formers. Users have increased periods between overhauls up to 100%! You can't get a more efficient, economical aviation oil!

For Radial Aircraft Engines, there's Gulf Aircraft Engine Oil—Series R!



Highly effective in retarding carbon and sludge formations in radial engines! This fine quality, non-detergent, straight mineral lubricating oil maintains its body at high operating temperatures. Especially recommended for maximum operating periods between overhauls!

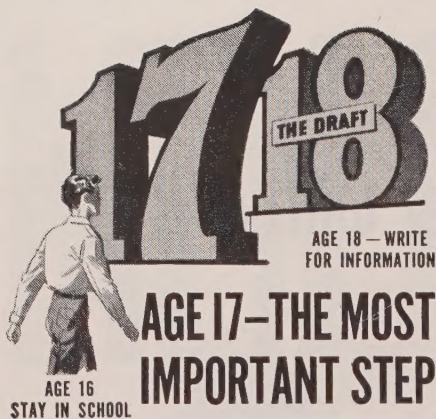
For MORE Flying Pleasure Don't Settle For LESS Than GULF!

The correct Gulf aviation oil will solve your lubrication problems. Once you've tried it, you'll agree!



It's great to go flying with GULF!

GULF OIL CORPORATION . . . GULF REFINING COMPANY



AGE 17—THE MOST IMPORTANT STEP

... If you want the **AIR FORCE** or **ESSENTIAL WORK** you must train for it before it is too late.

At 17 whether you realize it or not, you **MUST** make a vital decision—Whether you will prepare yourself for maximum service to our defense program—for better military qualification—for a future civilian career in connection with either military or defense—or whether to continue your present routine and take a chance on the future.

WISE YOUNG MEN ARE ACTING NOW. They are gaining skills that will qualify them for better positions in either military or defense fields. At 17 you still have time for training. **AVIATION IS AN ESSENTIAL INDUSTRY IN PEACE OR WAR . . .** and the **FUTURE** for one trained in Aviation can be almost without limit. **SO DON'T DELAY WHILE YOU HAVE TIME FOR THIS TRAINING.**

Since 1929 CAL-AERO has trained young men for Aviation Careers through peace and war, specializing in—

AERONAUTICAL ENGINEERING MASTER AVIATION MECHANICS JET ENGINE Maintenance & Overhaul MAXIMUM TRAINING IN MINIMUM TIME

TO MEN 18 OR OVER—Regardless of your draft status, let us send you information about Aviation Training for defense and eligibility for military preference.

TO PARENTS—If your son is approaching the draft age, give him a chance to get this finest training. It may be important to him; and to you!

CAL-AERO is an accredited higher institution, listed by the U. S. Office of Education, Engineering Curriculum approved by E.C.P.D., recognized by the U. S. Air Force and the U. S. Navy — Cal-Aero Engineering graduates are qualified educationally to become **AIR FORCE CADETS, NAVAL AVIATION CADETS and OFFICER CANDIDATES.**

During World War II Cal-Aero was first and trained more than 26,000 pilots and 7500 technicians for the military Air Forces, in addition to our civilian graduates going into essential aircraft work.

TODAY — Cal-Aero is again first in training military personnel, under contract to the U. S. Air Force, in addition to our regular civilian program—**WHAT BETTER RECOMMENDATION WOULD A SCHOOL HAVE!**

CAL - AERO
TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL
GLENDALE 1, CALIFORNIA

MAIL COUPON TODAY

CAL-AERO TECHNICAL INSTITUTE
Grand Central Air Terminal, Glendale 1, Calif.
Send full information and free catalog, immediately

- ☐ **AERONAUTICAL ENGINEERING**
☐ **MASTER AVIATION MECHANICS**
☐ **JET ENGINE—Maintenance & Overhaul**

HOME STUDY COURSES

- ☐ Aeronautical ☐ Aircraft Blueprint
Drafting Reading
☐ Stress Analysis and Design

NAME _____ AGE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

HIGH SCHOOL ATTENDED _____ Graduated: Yes ☐ No ☐

S-9 Check one: ☐ Veteran ☐ Non-Veteran

SKYWAYS

Cover: Boeing B-47

September, 1951

Russia's Newest Jet Fighter: La-17 . . . William Green 10
This is a new jet rumored to be undergoing combat-testing in Korea

Flying the Jet Stream . . . Capt. Charles F. Blair, Jr. 12
Trans-Atlantic non-stop hop in a Mustang rides jet stream winds of 300 mph

Muroc: Proving Ground for High-Speed Planes . . . Don Downie 14
Buck Rogers boys put secret jets through paces high over Muroc Dry Lake

"Poor-Man's Amphib" . . . R. N. Decker 17
An operator juggles his Cub around and makes an amphibian out of it

Fortune from the Sky . . . Harland Manchester 18
Sherman Mills Fairchild developed the aerial camera and a plane to go with it

20th Century Magellans . . . Capt. George Behrens, USAF 20
Weather chasers in WB-29's track down the elements for the Air Force in Korea

Forced Landing Formula . . . Frank L. Harvey 22
There's safety in knowing what to do in cases of aerial emergency

Movable-Wing Bell X-5 . . . 25
Air Force announces jet plane that changes wing sweepback in flight

Airways Down-Under . . . Norman Bartlett 26
Barnstormers with ingenuity developed giant air transport system

Air Control Group . . . M/Sgt. F. G. Braitsch 28
Marine Air Controllers stand watch on radar network, direct U.S. air defense

Dilbert . . . S. H. Warner & Robt. Osborn 30
It could happen to you . . . if you wear a too-loose parachute harness

Aircraft for Business . . . N. F. Silsbee 32
Greatest air transport growth shows up in increase of business-plane ownership

SKYWAYS for Business . . . 34
News notes of air operations in the field of corporate-owned aircraft

NAVICOM

L/MF Decommissioning Postponed . . . 57

New VHF Channels for Plane Communications . . . 59

VHF Airborne Equipment Authorized . . . 59

ARC-I Conversion Kit . . . 64

Air Your Views . . . 6 Military . . . 8

CAOA News . . . 36

J. FRED HENRY . . . Editor and Publisher

D. N. AHNSTROM . . . Managing Editor DON DOWNIE . . . Western Editor

CHARLES W. ADAMS . . . Art Director STANLEY M. COOK . . . Production Manager

PEGGY N. YAMRON . . . Asst. Art Director ARTHUR KAPLAN . . . Circulation Mgr. (Newsstand)

BENNETT H. HORCHLER . . . Advertising Director A. E. CARDWELL . . . Circulation Mgr. (Subs.)

SEPTEMBER 1951

VOLUME 10, NUMBER 9

J. Fred Henry Publications, Inc. publishes SKYWAYS at 444 Madison Avenue, New York 22, New York. Advertising Offices: 444 Madison Avenue, New York 22, N. Y.; 6 N. Michigan Ave., Chicago 2, Ill.; 816 W. 5th Street, Los Angeles 17, Calif. Gordon Simpson, West Coast Manager. Thomas W. Bryant, Jr., Chicago Manager.

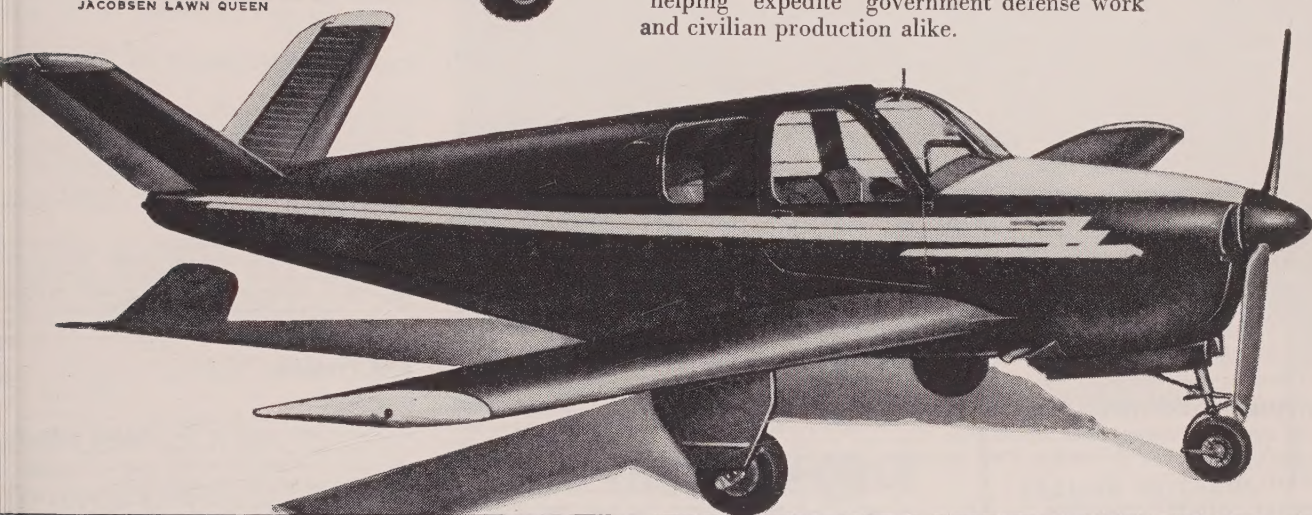
The following publications are combined with SKYWAYS: Air News and Flying Sportsman. All rights to these names are reserved by J. Fred Henry Publications, Inc.

**Why no grass
grows under this
mower maker's
feet!**



JACOBSEN LAWN QUEEN

Jacobsen Manufacturing Company, pioneer builder of power mowers, is located at Racine, Wisconsin, far from its affiliates — Worthington Mower Company, Stroudsburg, Pennsylvania, and Johnston Lawn Mower Corporation, Ottumwa, Iowa. In time, however, all three concerns are close. Each has a Beechcraft Bonanza. This means that Mr. O. T. Jacobsen, President, and officials of the affiliated companies can meet at Racine, return home with no time lost. Sales trips have more "sales" and less "trip." These Bonanzas are in the air almost daily, helping "expedite" government defense work and civilian production alike.



Compare these great C35 Bonanza features

Economy: When cruising, you use only 65% of available engine power. This results in longer engine life, lower operating and maintenance costs. Cruising-speed fuel consumption 9½ gallons per hour—a remarkable engineering achievement.

High performance: All-metal continuously variable pitch Beechcraft propeller has 85% efficiency — top range for its class. Take-off rating 205 h.p. at 2,600 rpm. Means even better short field performance, rate of climb of 1,100 fpm.

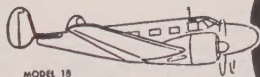
Unsurpassed safety: Now standard on C-35—Beechcraft Hi-Strength Safety Harness. New freedom of movement, unsurpassed protection. For added comfort, rear seat is two-position, with headrest. New fresh air intake increases ventilation.

For more news of this feature-packed business plane, contact your Beechcraft Distributor, or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

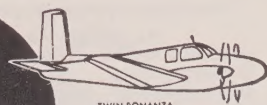


BONANZA

Top speed, 190 mph
Cruising speed, 175 mph
Range, 775 miles
Fuel economy, 19.9 mpg



MODEL 18



TWIN-BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



WHICH OF THESE
**NAVIGATION
AIDS**
DO YOU NEED?

THE WEEMS LINE includes many navigation aids and instruments which are standard equipment with U. S. Air Forces, major air lines and foreign governments. Many are navigation "musts" for pilot and student alike, especially the Weems Mark II Aircraft Plotter, the Dalton E-6B, or Mark VII Computer. A few of them are described below. Many others are available.

WEEMS MARK II PLOTTER: Scale fits sectional and world air charts. Used for plotting bearings, courses, measuring distances, constructing wind diagrams and angles. Only \$2.00.

DALTON E-6B COMPUTER: Two sides. One for solving all vector problems—wind, true heading, ground speed. Other side graduated for computing speed-time-distance, fuel consumption, air speed and altitude corrections, as well as statute-nautical mile conversions. Only \$10.00 complete.

DALTON MARK VII COMPUTER: Vector side "mocks-up" track-drift-true heading triangle, allows simple, easily oriented setting-up and solution of all wind problems. Computer side for speed-time-distance, fuel consumption, air speed and altitude corrections, and statute-nautical mile conversions, plus erasable air speed calibration chart and flight log. Only \$5.00.

WEEMS PROPORTIONAL DIVIDERS: Given any two of three quantities (speed, time, distance), you can find the third in a few seconds. \$24.00.

CROSS-COUNTRY COMPUTER: The well-known Mark VIII Computer with addition of flight log and securing straps. Solves all speed-time-distance problems. Only \$4.00.

IMPORTANT NEW BOOKS: *Flying The Omnirange* by Zweng. Tells how to fly cross-country by means of new Omnirange facilities. \$4.00.

Practical Air Navigation by Lyon. Invaluable to pilot and student alike. \$2.50.

Instrument Flying by Weems & Zweng. \$4.50.

Electronic Navigation by Orman. Explains workings of Radar, Loran, etc. \$4.50.

Government Charts and Publications: A complete line.

WEEMS AIR NAVIGATION SCHOOL: Established 1927. Resident and Correspondence Courses. Send for details. Enrollment approved under G. I. Bill.

"See Your Aviation Supply Dealer"
OR, WRITE DIRECT FOR FREE CATALOG

Address Department 6
Weems System of Navigation
Annapolis, Maryland



AIR YOUR VIEWS

Transports in Korea

Gentlemen:

Your caption on the Fairchild Packet C-82 (June issue, AF section) says the C-82 has seen a great deal of service in Korea. Navy a Packet has dragged its boom across or into Korea. Several C-82's in 1943 or 1947 were in Japan for a month or so. Now the C-119 "Pack" has seen service in Korea . . . and plenty of it. They've been in and out of fields with a 25 miles of the Yalu River. They are wonderful for aerial drop. One pass over the DZ and all is dropped. You say they carry 30,000 pounds. At present the old Curtiss C-46 *Commando* carries more cargo by weight than the C-119. The C-46 grosses off at 52,900, carrying over 10,000 pounds with full tanks on almost every trip into Korea. The C-119 carries about 9,000 pounds and has 3200 hp per engine as against the 2,000 hp per engine of the C-46. The C-54's carry 12,000 to 17,000 pounds of cargo depending on the gas load required.

Shortly after the war began, the C-47 was the backbone of aerial transport into Korea because of the lack of suitable fields to handle the C-54 and C-46. Soon as the strips were planked and made available, the bigger aircraft started to haul in freight. As for safety records, the C-119 has had its share of prop trouble, boom trouble, and elevator trouble. The C-54's have had their share of engine fires and failures and crashes. The C-46's have had about the same percentage of mechanical failures. One strip in Korea was too small for C-46's, and six were lost there before the field was closed to the C-46. The C-47 is seen everywhere in Korea, and it hauls everything from rice to cots. Some C-47's are pushed for generals, while others drop flares at night for aerial observation and gunnery for B-26's. Even the T-6, which is supposed to be "dead," is right over the lines. They fly as target observers and carry rockets under the wings which are used to mark targets. Personally, I'm looking forward to the Chase 123. I've yet to see one but I've sure read a lot about it.

LT. W. N. MOOSE, USAF

Tachikawa, Japan

Yours is one of the most informative letters we've ever received, Lt. Moose, and thanks for it. The Packet information provided for the captions came to us from Washington. Apparently, it was not up to date. You're right in looking forward to the C-123 . . . it's a beaut.—Ed.

McDonnell FH-1

Gentlemen:

I greatly appreciated your special Air Navy issue, but I think you forgot a very important Navy plane, the McDonnell FH-1 Phantom.

R. DORR

Silverhill, Md.

We didn't forget it, Mr. Dorr, but that airplane is no longer in production, and the FH-2 Banshee is the McDonnell jet now on the production line.—Ed.

Douglas Super DC-3

Gentlemen:

If you check, I think you'll find that the Navy version of the Super DC-3 has larger engines than you credit it with having in the "Naval Facts and Photos" section.

C. J. DIX

Venice, Calif.

That's entirely possible, but Washington gave us the information permissible to use. I guess

upping the horsepower of the R-1830 is considered "classified" information not for specific publication.—Ed.

Company Addresses

Gentlemen:

Kindly give me the addresses of the following aircraft companies: Douglas, Boeing, Chase, Northrop. I have a new and different design in a aircraft which I will submit upon completion of the model.

TED LASKER

Willoughby, Ohio

Douglas Aircraft Company, Inc., 3000 Ocean Park Blvd., Santa Monica, Calif.; Boeing Aircraft Company, Box 3107, Seattle 14, Washington; Chase Aircraft Co., Inc., West Trenton, N. J.; Northrop Aircraft, Inc., Northrop Field, Hawthorne, California. Okay?—Ed.

B-19 Problem

Gentlemen:

How many B-19 bombers were made? That is, completed and tested by the USAF. I claim there was only one of them. I don't remember who was the maker of the B-19, but maybe you can get the information for me anyway.

PFC. N. B. TOOTHMAN

R. Co. 1st Tank B. 1st Mar. Div.
F.M.F. c/o F.P.O. San Francisco, Cal.

The B-19 (XB-19) was designed and built by Douglas in 1937 as a long-range bombardment plane. You are right . . . only one was built and tested by the AF.—Ed.

Jet Trainer

Gentlemen:

On the top of page 35 in your July issue you show an airplane labeled a TO-1 jet trainer. Isn't that an F-80?

D. GUERRERO

Denver, Colorado

In a way, yes. The TO-1 is the jet trainer version of the F-80. It's the same airplane as the F-80C, but is the Navy's designation. The TO-2 is also a jet trainer (Navy): it's the Navy's trainer version of the two-place T-33.—Ed.

Designations

Gentlemen:

I have often wondered what the letters AD in XA2D and AJ in AJ-1 stand for. There are others, too, that I'm not sure of. Would you tell us what they all stand for?

J. GERRISH

Sault Ste. Marie, Mich.

The first letter is the plane designation, in this case X in the XA2D means "Experimental," the "A" means "Attack," and the "D" stands for the manufacturer, in this case "Douglas." Again, the "A" in AJ-1 stands for "Attack," and the "J" is North American Aviation's letter. The "1" means its the first variation or version of the type. The "2" in XA2D means it's an entirely new Attack design by Douglas. Here are the letters assigned to the companies: B—Beech; E—Boeing; C—Curtiss-Wright; D—Douglas; E—Piper; F—Grumman; H—McDonnell; J—North American; L—Bell; M—Martin; N—Naval Aircraft Factory; O—Lockheed; P—Pittsboro; Q—Fairchild; R—Ryan; S—Sukorsky; T—Northrop; U—Chance Vought; V—Lockheed; Y—Consolidated.

ated Vultee. The Air Force designations are: —Bomber; C—Cargo and Transport; F—Fighter; H—Helicopter; L—Liaison; Q—Target and Drone; R—Reconnaissance; S—Search and Rescue; T—Trainer; and X—Special Research. The Navy's designations are: A—Attack; F—Fighter; P—Patrol; R—Transport; U—Utility; and T—Trainer. Will that help?—Ed.

switch

Gentlemen:

I believe the pictures of the British Vickers 60 and the Chase XC-123A were mixed up in our August issue.

C. JOHNSON

New York, N. Y.

They were! In this case the switch was pulled on us at the plant, inadvertently, of course. At any rate the pages left this office okay, but something happened somewhere along the line that caused the mixup. Sorry.—Ed.

Sikorsky HO4S-1

Gentlemen:

In the July issue you say that the Navy's HO4S-1 is a version of the S-55. Don't you mean the Sikorsky H-19?

S. YEATON

Belgrade, Maine

In a sense, we're both right. The HO4S-1 is the Navy's version of the commercial (or civilian) S-55 or the Air Force's H-19.—Ed.

Horsepower vs. Pounds Thrust

Gentlemen:

I would like to know the approximate horsepower developed by a jet engine of, say 5,000 pounds thrust. The words "pounds thrust" are rather meaningless to the average person unless we can translate them into horsepower.

C. W. HILL

Amesbury, Texas.

According to a formula reported in G. Geoffrey Smith's latest and very good book on "Gas Turbine and Jet Propulsion," to find the horsepower equivalent to pounds of static thrust, you divide the static thrust (pounds) by 2.6. The formula reads: $\text{Equiv. hp (nominal)} = \frac{\text{Static thrust (lbs)}}{2.6}$

In short, 5,000 pounds of static thrust is equivalent to approximately 1,923 hp.—Ed.

Mosquito Dope

Gentlemen:

Could you please give me some information on the de Havilland DH 98 Mosquito Mark II: wing span, weight, horsepower per engine, etc. Was it used extensively during World War II?

R. Breitenback

Wauwatosa, Wisconsin

The Mosquito II was a two-place day and night fighter monoplane powered by two Rolls Royce Merlin 21 engines, each rated at 1280 hp. It had a wing span of 54 feet 2 inches; an empty weight of 14,622 pounds.—Ed.

Ninety-Nines

Gentlemen:

In your Hangar Flying column in the July issue you mentioned the Ninety-Nines. Could you give me their address?

A. C. MADONIS

Rockville Hts, N. Y.

Official address of the Ninety-Nines is 1025 Connecticut Avenue, N.W., Washington 6, D.C. The president of the organization is Kay Brick, of New York, N. J. It is an organization of licensed women pilots. The Ninety-Nines, by the way, are sponsoring their 5th annual All-Woman Transcontinental Race. The event is scheduled for August 15 to 19. Fifty planes will fly a dog-leg course from Santa Ana, California, to Detroit, Michigan, covering a distance of 2,348 miles.—Ed.

Commonwealth and Commonwealth, Ltd.

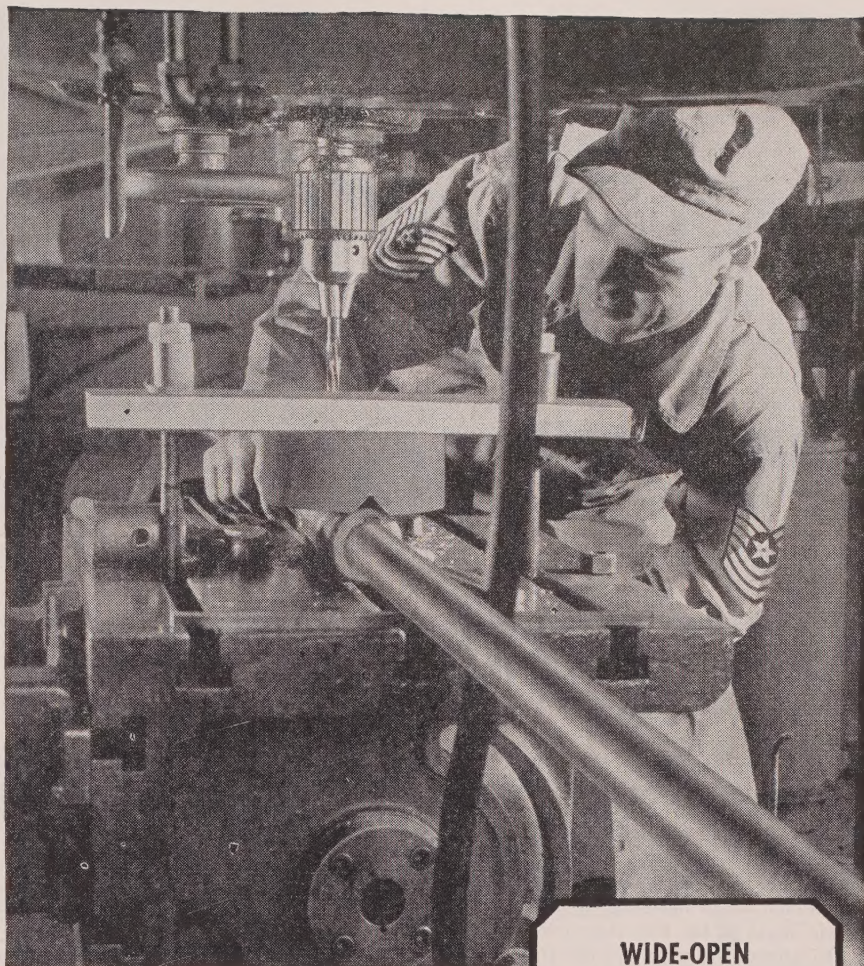
Gentlemen:

In this column, August issue, you told a writer that the Commonwealth Company went out of existence. In another magazine I saw a picture of a plane made by Commonwealth Aircraft Corp for the RAAF. This plane was designated CA-22. Is there any connection between the two Commonwealth companies?

H. DECKER, JR.

Baltimore, Md.

None whatsoever. The Commonwealth Aircraft Corp. that builds the CA-22 is an Australian outfit founded in 1936. It is building aircraft for the Royal Australian Air Force.—Ed.



Metal Working is but one of the many technical fields in which the Air Force offers unusual opportunities today.

WHAT THE AIR FORCE OFFERS VETERANS

With Technical Training and Experience

If you are a veteran of any branch of the Armed Forces—with an essential technical skill—find out what the U. S. Air Force can offer you today!

Here are just four of the reasons why so many veterans with special skills have been moving into the Air Force:

FIRST, if qualified, you can enter the Air Force at your old grade or better, according to your present ability.

SECOND, the Air Force will tell you exactly what your initial rating and pay grade will be, before you join up.

THIRD, you will skip basic training, and be assigned initially to a nearby Air Force base.

FOURTH, today's fast-growing Air Force offers better pay, and more chances for rapid advancement, than ever before.

Hear the whole story. Tell the Air Force what you have to offer . . . ask the Air Force what it can offer you.

WIDE-OPEN
OPPORTUNITIES
FOR

TRAINED VETERANS
in these and
many other fields:

AIR TRAFFIC CONTROL

ARMAMENT

ENGINE MAINTENANCE

METAL WORKING

PHOTOMAPPING

RADAR

RADIO

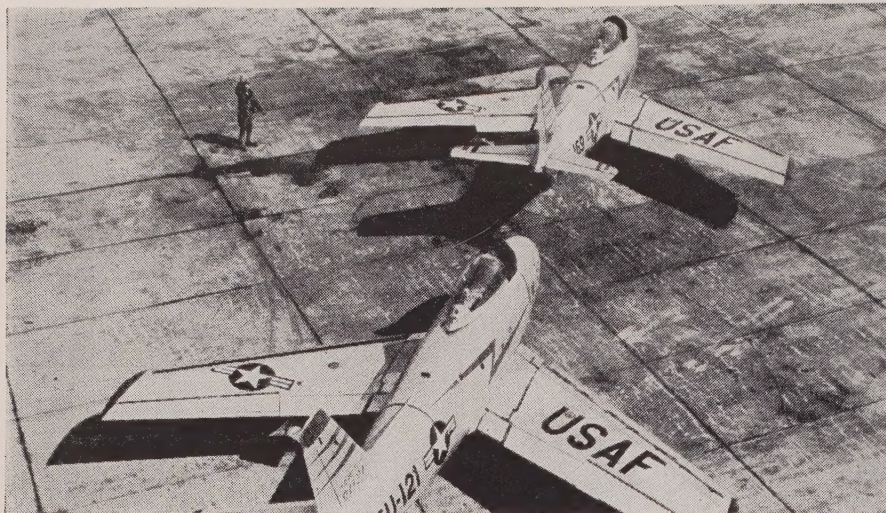
ROCKET PROPULSION

WEATHER

Visit your U. S. Army
and U. S. Air Force
Recruiting Station today



U. S. AIR FORCE



AIRMEN at Otis spot two F-86's to show positioning for "artificial respiration" starts

MILITARY AVIATION

Artificial Respiration

Airmen in Korea have come up with a new way of starting the J-47 engines in the F-86's: the exhaust blast from one jet is used to start the jet engine in another plane directly behind it. The procedure is to align the tailpipe of an operating jet in front of the air intake of the F-86 that is to be started. To protect the pilot and the airframe of the rear plane from the high-temperature exhaust gases coming out of the tailpipe of the "starter" F-86, the to-be-started '86 is aligned some distance aft of the front '86. With the engine of the front plane at full power, its exhaust blast windmills the engine of the rear plane to normal firing speed so a normal start can be made. The only time this method is used, however, is when the planes are operating from advanced bases where external power units are not available and the plane's own power unit is inoperative.

Thunderjet, G-model

The first operational jet fighter plane to roll off the production line fully equipped for mid-air refueling by tanker planes was announced recently by Republic Aviation Corporation, designers and builders of the jet F-84 series. This new *Thunderjet* is designed F-84G and it features several improve-

ments over its battle-tested predecessor, the F-84E. The 'G has longer range, faster climb, and provides for easier maintenance. The mid-air refueling system of the F-84G is designed for use with the Boeing-developed "flying boom" method of in-flight refueling. In this the operator in the tail of the tanker plane operates a telescoping boom with directional control surfaces to guide the boom into the wing receptacle of the close-flying fighter. After the boom-nozzle engages the fighter, fuel transfer becomes automatic. A complete refueling can be accomplished within two-and-a-half minutes, with fuel passing to the fighter plane at a rate of several hundred gallons a minute.

The F-84G eventually will replace F-84E production and will be delivered to USAF fighter wings and to countries participating in the Mutual Defense Assistance Program.

SA-16 Rescue

Lt. John J. Najarian, of the Japan-based 3rd Rescue Squadron, flew at night through heavy flak behind enemy lines to rescue a UN fighter pilot from a river. Once over the river, Lt. Najarian decided not to use the SA-16's landing lights for fear of giving enemy gunners a better target in the darkness. However, fast UN fighters with lights on

made several passes over the downed pilot to indicate to Najarian the approximate area in the river for the amphibian to land. Under fire from enthusiastic enemy gunners, Lt. Najarian brought the SA-16 in, spotted the downed airman's faint flashlight signals, and hauled him aboard the SA-16. Lt. Najarian then took off again, still under fire, and flew back to the UN base, another rescue to add to the growing list made by the Grumman SA-16 amphibians.

Turbojet Starter

A 140-hp air turbine starter, powerful enough to start turbojet and turboprop engines in the 10,000-pound thrust and 8,000-hp class within 10 to 30 seconds, has successfully completed AF tests. Developed by AiResearch Manufacturing Co. of Los Angeles, the starter unit weighs just 32 pounds and is not much larger than the ordinary one-horsepower automobile starter. Like other starting equipment, the 140-hp starter is a low-pressure pneumatic unit.

News Notes

U.S. NAVY's Bureau of Yards and Docks is speeding completion of a new aeronautical turbine laboratory at Trenton, N.J. Specifically designed to test Navy jet engines, the lab will consist primarily of five testing chambers.

CIVIL AIR PATROL announced the appointment of Edward E. Slattery, Jr., as National Capital Wing public information officer, with rank of Major. Major Slattery was appointed chief of Public Information of CAB in 1942.

RYAN AERONAUTICAL has received multi-million dollar contract for refueling pods for Boeing KC-97 flying tanks. Deliveries have already begun and are scheduled to continue through 1952.

NORTH AMERICAN AVIATION, Columbus Division, announces the appointment of Stanley C. Hellman as assistant general manager.

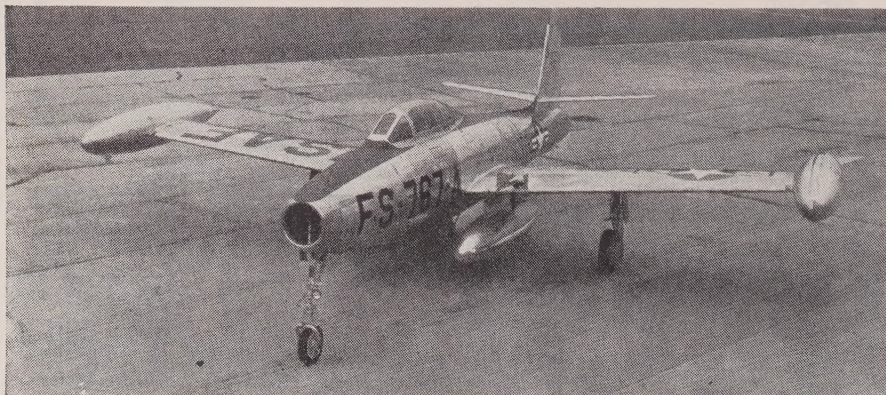
CONVAIR reports the appointment of Edward F. Jones as assistant to the president of Consolidated Vultee Aircraft Corp. Mr. Jones has been chief Life magazine correspondent in Washington for several years.

CHANCE VOUGHT has received authorization from Navy BuAer for manufacture of a quantity of F4U *Corsairs* to be delivered to French Govt. under Mutual Defense Assistance Program.

DOUGLAS AIRCRAFT has received production orders for two types of guided missiles: one for the Navy, and one for Army Ordnance Corps.

REPUBLIC AVIATION reports the election of R. C. Taylor to Board of Directors. Mr. R. Elmer Minton has joined Republic as facilities coordinator to expedite expansion activities.

FAIRCHILD announces the appointment of Walter Tydon as Chief Engineer of the Fairchild Aircraft Division. Mr. Tydon is well-known aviation engineer and aircraft designer, having gained a wealth of experience in 25 years of aviation work.



REPUBLIC F-84G is the *Thunderjet* model equipped for Boeing-developed mid-air refueling

PLANE FAX

Quick picture of MARTIN'S AIRPORT Walla Walla, Washington

Privately owned . . . extra long, hard-surfaced runways, lighted on request . . . station wagon transportation furnished . . . complete Standard Oil Service. Host airport for 1951 Convention of Washington State Flying Farmers.

Flying Farmers make planes pay



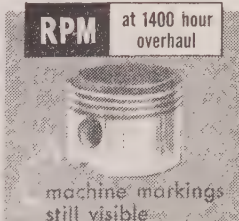
Herman L. Martin, "airport host" to the Flying Farmers this September, says: "On our Washington ranches, planes are both work horses, and pleasure craft, ready for quick action in emergencies. Here are a few ways farmers keep their planes in top shape . . .



When taxiing on dusty or sandy fields, help keep your engine clean by leaving carburetor heat *off*, since air drawn in through muff heaters may not pass through the air filter. Turn it *on* during your engine run-up, and return it to *full cold* for your take-off and climb.



A clean engine means better performance, longer life. On one farm plane we service, overhaul time has gone up from 500 to 1400 hours since using only RPM Aviation Oil. Our inspection showed so little ring wear with 'RPM' that machine markings were still visible at overhaul time. Also, valves were found to be completely free of lacquer deposit from oil oxidation.



In farm flying, planes often have to take off from rough and ready fields—where dependable power is vital. That's why so many flying farmers I know depend on Chevron 80/87 Aviation Gasoline. Not only does 80/87 provide more powerful take-offs, it eliminates detonation. Economical, too—it costs less than 91/98, which means *more* flying hours for less money."

T.M.S. "RPM," "CHEVRON," REG. U.S. PAT. OFF.

TIP OF THE MONTH

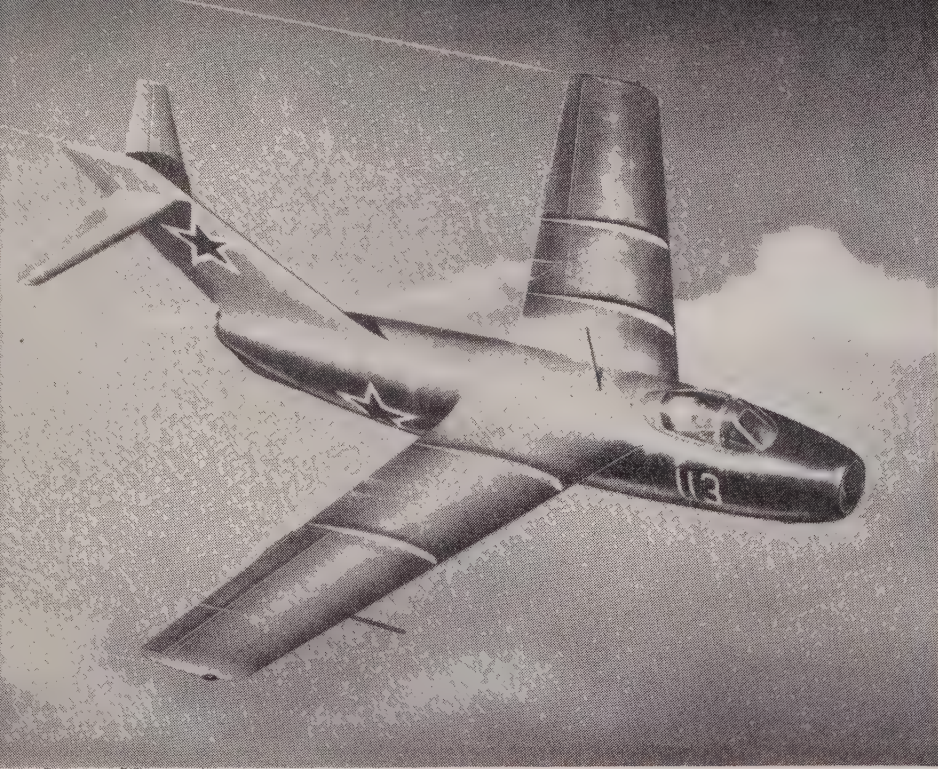
SLOW DOWN FOR TURBULENCE OF
deserts mountains storms
canyons



Don't try to "outrun" turbulent air. When it gets rough upstairs, don't increase your airspeed to outdistance those jarring bumps. Instead, *throttle back* to a low airspeed consistent with safe flying practices. You'll save wear and tear on both yourself and your plane.



STANDARD OIL COMPANY
OF CALIFORNIA



Russia's Newest Jet fighter La-17

EVIDENCE indicates a new Russian Jet fighter, La-17, may be in operational use by Communist pilots in Korea

The behind-scenes furore that followed the appearance of the MIG-15 fighter in Korean skies last year and percolated throughout Allied military aviation circles has flared up again. This time as the result of increasing evidence of an even later and more efficient single-seat fighter which is rolling off Soviet assembly lines at an ever increasing tempo and is believed to be playing its part in the build-up of Communist air power in the Far East.

A more recent design than the MIG-15—itsself capable of outflying the majority of American and British fighters in service today—the new fighter is the work of Hero of Socialist Labor Semyon A. Lavochkin and is reportedly designated La-17.

First test-flown in 1948, the La-17 (which designation we would emphasize has yet to be officially corroborated) is the first of Lavochkin's jet-fighter designs to be accepted for mass production, his previous effort in this sphere being the abortive La-15. Semyon Lavochkin, born in Smolensk in 1900, first entered the limelight in 1939 when, with designers Gorbunov and Gudkov, he produced a fast single-seat fighter designated LaGG-1 which, in developed form and redesignated LaGG-3, entered quantity production in 1940.

During the past decade Lavochkin has produced a number of efficient single-seat radial-engined fighters, including the all-wood La-5 and La-7, and the all-metal La-9 and La-11, which have been widely used by the fighter regiments of Russia and her

By WILLIAM GREEN



LAVOCHKIN La-17 is a single seater with wing sweepback of 32°, 40-foot span. Note large vertical tail surfaces



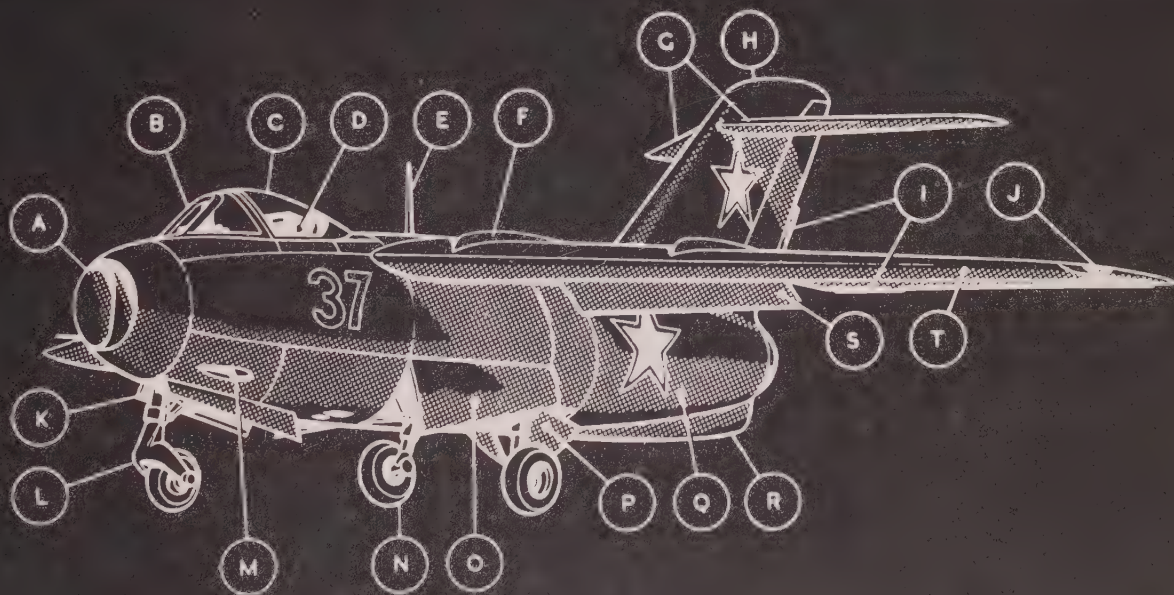
FLIGHT PHOTO of the fast La-17 was made right after take-off. Estimated top speed is in vicinity of 640 mph

satellites and have brought Lavochkin to the top rank of Red fighter designers.

For some years past reports of formations of fast, swept-wing fighters have filtered through the chinks in the Iron Curtain, but the design origin of these jet fighters was in doubt. All the topline fighter designers had such machines under test and it was not until the end of 1949 that a sketchy picture of Soviet fighter production plans began to emerge from the

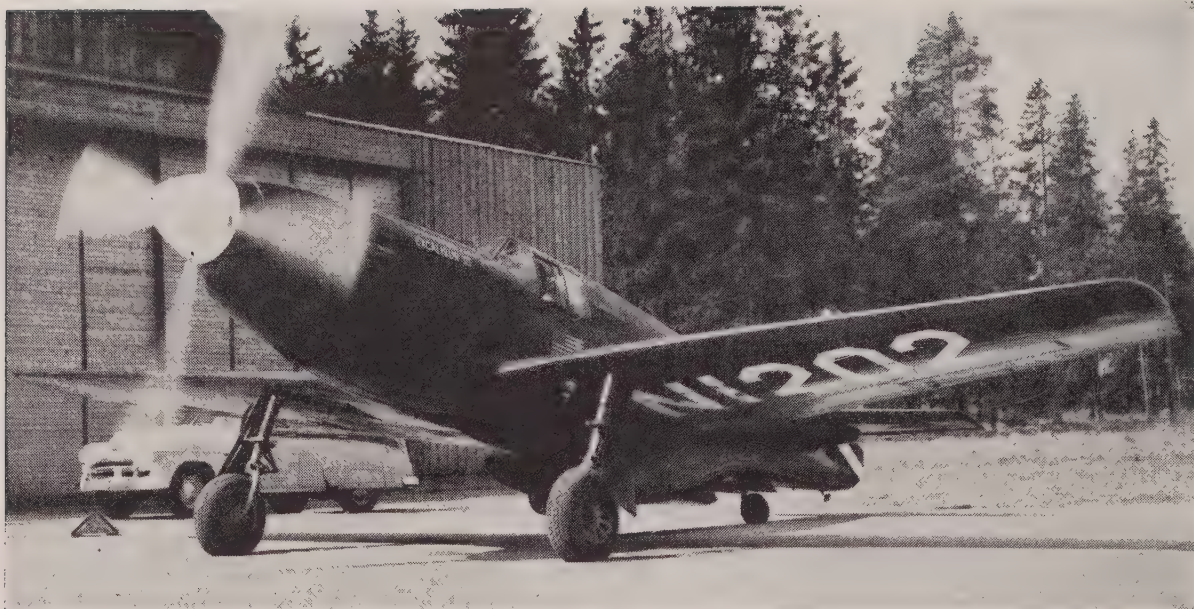
mists of carefully fostered rumor and spurious propaganda material. At last, in Allied Intelligence circles at least, the design origin of the two fighters chosen for mass production was no longer in doubt; one was the MIG-15 emanating from the Mikoyan-Gurevich team and the other was a design by Semyon Lavochkin—the La-17.

Since that time a very large part of the Soviet airplane industry's produc- (Continued on page 42)



A DIVIDED AIR INTAKE TO JET ENGINE
B BULLET-RESISTING WINDSCREEN PANEL
C SLIDING 'TEARDROP' CLEAR-VIEW CANOPY
D EJECTION SEAT FOR HIGH-SPEED EXIT
E OBSOLETE MAST SIGNIFIES T.R. RADIO ONLY
F WING 'FENCES' CONTROL SPANWISE AIRFLOW
G TAILPLANE SWEEPBACK GREATER THAN WING
H LARGE-AREA SWEEPBACK FIN
I FIXED TABS FOR GROUND TRIMMING

K NOSEWHEEL FAIRING DOORS
L NOSEWHEEL RETRACTS BACKWARDS
M TWO HEAVY-CALIBRE GUNS
N WHEELS RETRACT FORWARD INTO FUSELAGE
O DOORS ENCLOSE MAIN WHEELS IN FUSELAGE
P AIR BRAKES SLOW LANDING & DIVE SPEED
Q REAR FUSELAGE REMOVES FOR ACCESS TO J
R VENTRAL FIN AREA CUM TAIL BUMPER
S LANDING FLAPS—USED ALSO AT TAKEOFF
T 30-DEGREE SWEEPBACK WING



MUSTANG flown by Capt. Charles Blair on record flight across Atlantic was powered by Packard-built Rolls-Royce Merlin

Flying the Jet Stream

Reconnaissance of jet stream made during non-stop trans-Atlantic hop

By Capt. Charles F. Blair, Jr.

Pan American World Airways



THIS reconnaissance of the North Atlantic Jet Stream took place on January 31, 1951 during a high-altitude non-stop flight from New York to London in a converted F-51 *Mustang* fighter. This date was especially selected for the flight because of the extreme violence of the winds aloft prevailing on the North Atlantic on that particular day.

Perhaps it would be a good idea at this point to say something about what this so-called jet stream really is. In simple language, it is nothing more than an extreme intensification of the prevailing westerlies, which intensification on the North Atlantic is usually associated with the polar front and which is usually somewhat localized. The weatherman doesn't start talking about jet-stream winds until he starts recording winds which exceed 100 knots (115 mph)

in velocity. Occasionally, during the winter months, the upper-air winds will go higher than 200 knots (225 mph). These extreme winds, however, are usually quite local-

CAPT. BLAIR is shown here just before his take-off on high-altitude non-stop air trip to London from New York

ized, and it is difficult to find a wind of great violence along the entire route from New York to London.

After carefully looking over the upper-air charts for a three-month period during the current winter, I finally trapped a specimen which looked like an interesting set-up for most of the route to London. Because I was concerned with achieving a high ground speed, I wanted these winds to be following winds insofar as possible.

The airplane I used for this particular flight was a single-engine F-51 *Mustang* fighter. It was built during World War II by the North American Aviation Company, and was powered by a Packard built Rolls-Royce *Merlin* engine, type 1650-9. The "dash nine" series of Packard *Merlins* appeared to be especially adaptable to North Atlantic operations because it is supercharged for operation at extreme altitudes. It is possible to carry the allowed maximum continuous power (2700 rpm and 46 inches manifold pressure) as high as 35,000 feet. It was also my opinion that the "dash nine" was the most rugged of the *Merlins*.

Referring to the rugged nature of this Packard *Merlin* engine, it is interesting to note that Paul Mantz and Joe DeBona made a practice of using full take-off power (3,000 rpm and 61 inches manifold pressure) for the entire distance from Los Angeles to Cleveland in their Bendix Race competition. Over a period of years and several races, these gentlemen failed to experience any serious engine trouble at this extreme power setting. I, therefore, had a great deal of confidence in this piece of machinery. During the record run to London, I used rated power throughout the entire journey. (2700 rpm—46 inches manifold.

I bought the plane from Paul Mantz who had used it in four Bendix Races in which he placed first twice. Needless to say, I installed a new engine—a "dash nine" engine.

I further modified the aircraft by increasing the fuel capacity some 200 gallons. The

total fuel capacity is now 365 U.S. gallons distributed in four fuel tanks. The entire wing is an integral-type fuel tank divided into three sections. The wing as such carries 690 gallons and there is a nylon fuel cell in the compartment aft of the pilot's seat which has a capacity of 175 gallons. This fuselage fuel was burned off first because the plane was a little unstable until the tail-heavy condition induced by this rearward tank was alleviated.

This 365-gallon fuel supply allowed a range of 3,000 nautical miles at maximum continuous power, 340 knots (390 mph) cruising speed; it allowed a range of 4500 nautical miles at 280 knots (320 mph) constant airspeed at 25,000 feet. Top speed was 410 knots (470 mph).

I had a 10-gallon reserve oil tank with transfer pump and a 16-hour oxygen supply. For extra long-range operations, this oil supplements the 21-gallon capacity of the main oil system.

I completely modified the radio set-up, installing two Lear tunable VHF receivers. I also had an HF transmitter with trailing wire antenna and an HF receiver. The HF transmitter was a single-frequency affair. Two Lear automatic direction finders were installed, the two loops (*Continued on page 46*)



COCKPIT of the *Mustang* was laden with radio equipment, including two Lear VHF's and ADF's. A separate cut-out switch enabled Blair to cut out pitch, roll, yaw, elevator trim in case of failure



MUROC...

Proving Ground for High-Speed Planes



MUROC is home of Edwards AFB. Here the Flight Test pilots first fly most of the new planes, plausible as well as the fantastic. Air Force personnel live in the 724 housing units that adjoin the five-by-12-mile dry lake landing field

Called "best flight lab in world,"

Muroc is base for Buck Rogers boys

TRANSMITTER and wire recorder used to contact pilots in trouble are demonstrated by Lt. Curtis with Capt. Killian





AIR FORCE test pilot takes off from broad surface of Muroc Dry Lake in a JATO-equipped Lockheed F-90 jet pene-

tration fighter. Town is called "Muroc" in honor of Corum (spelled backwards) brothers who homesteaded the area

MOTHER NATURE built the setting long ago. Now the Air Force uses it as

By DON DOWNIE

a proving ground for tomorrow's military planes.

"This is the best flight laboratory in the whole world. None of the foreign pilots who visit us have ever seen anything like it," said Lt. Col. Gust Askounis, Chief of the Experimental Flight Test Section at Edwards Air Force Base. This experimental base adjoins Rogers Dry Lake in Southern California's desert. It's big, sandy and isolated from prying eyes. Here the Air Force first flies most of the new aircraft, the plausible as well as the fantastic.

It was here that the famed Bell X-1 first cracked the so-called sonic barrier. Here the first flights were made with the prototype Lockheed F-80 *Shooting Star*, the Republic F-84, the Douglas B-43, North American's B-45 and the Douglas *Skyrocket*.

The best natural flying field in the world is a five-by-12-mile dry lake. "It's the best life insurance we've ever had," explained Lt. Col. Frank K. Everest Jr., second man to fly the X-1 above the speed of sound. "Where else would you feel completely comfortable in the X-1, a rocket-powered research plane that makes every landing a 'dead-stick' touchdown—a forced landing at roughly three miles per minute!"

There's much more to this desert testing station than the spectacular first flights of prototype aircraft. Here the Air Force carries out five phases of a six-phase shake-down on every airplane that it contemplates buying. Phase I is a series of first flights handled by company contract pilots. It may take anywhere from three to six months—sometimes even longer. The F-88, for instance, took 13 months

BRIG. GEN. BOYD flew F-80 at record speed over Muroc course

KNEEPAD for notes is essential in test business. Pilot is Lt. John W. Konrad

PAPER WORK is big part of test flying job for the Air Force men



of original testing in the important Phase I.

Phase II is a two-to-three week program flown by the 18 Air Force pilots assigned to Edwards to substantiate or disprove the predictions of the design engineers. Air Force directors report that the factory pilots are generally very frank in their original reports and Phase II results seldom if ever disagree with them. These flights are mainly interested in performance, stability and control. Then the Air Force test pilots recommend any changes or modifications, and the airplane goes back to the contractor.

If the new plane is good enough to warrant fur-

TEST PILOT school was transferred from Wright-Patterson to Edwards. Students are pilots with engineering education



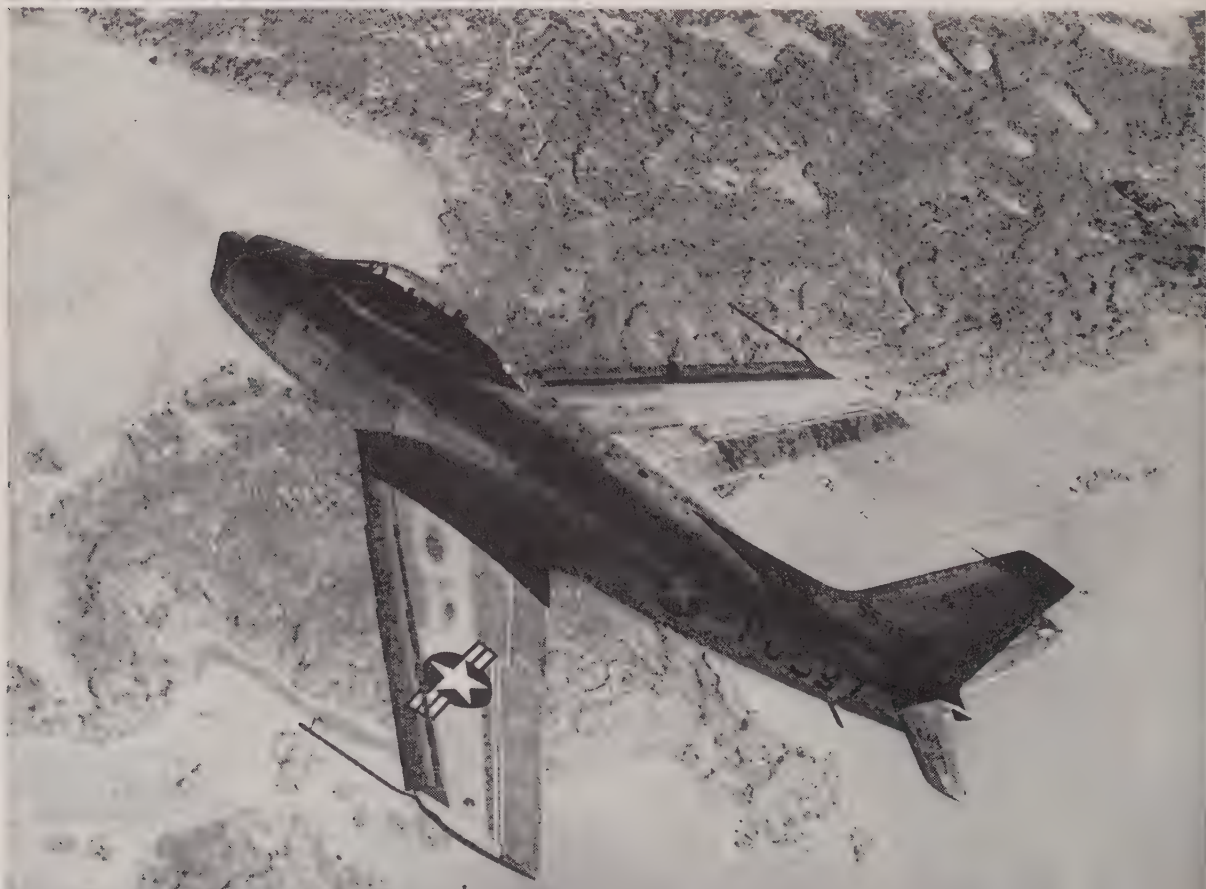
QUALIFICATION BOARD tells Col. Askounis (left), Capt. R. Roth, Lt. Konrad which airmen have flown what airplanes

ther research, it goes into Phase III where the contractor re-flies the airplane after making the Air Force-suggested improvements and modifications, resulting from Phase II. This may take a week . . . or a couple of years.

Phase IV is close to the production airplane. Actually, it is a "qualitative analysis of the stability and handling characteristics" of the new plane and includes a re-check of the first three phases. In addition, tech orders are prepared to cover take-off distance, fuel consumption, time to climb to 40,000 feet and maintenance directives.

Phase V is all-weather flying. Since the weather at Rogers Dry Lake is over 99 per cent contact throughout the year, this phase of the experimental work is done at Wright- (Continued on page 44)

AIR FORCE F-86 Sabre is shown here in test flight over a section of the Southern California desert dry lake





LANDING GEAR to make seaplane amphibious was slung between the floats

AIRPORT people are constantly startled by sight of seaplane taxiing to gas pump



"Poor Man's" Amphib

The dreams of many a sportsman pilot may soon come true and much utility added to the light-plane, thanks to an idea conceived about two years ago by Mr. Richard Blow of New York City. Mr. Blow thought that a light, quickly detachable, and relatively inexpensive gear could be devised to make a conventional seaplane amphibious. He asked me to go to work on the idea. Two years and five models later we came up with just that.

The landing gear to make the seaplane amphibious is slung between the floats (Edo 1400's) which are reinforced at the point of suspension by a "saddle" of heavy gauge aluminum. Shock-cords are used to cushion the strut, and the dual wheels of the gear have individual brakes. The wheels, by the way, are the same as used on the particular landplane model, in this case a J-3 *Cub*.

The gear swings on pivots at the point of suspension on the floats, and is locked down by a drag-link with a built-in snap lock. A simple cable and pulley arrangement enables the gear to be swung forward and upward to the retract position. The tails of the floats are protected by tailskids ending in small spoons which slide freely over the ground.

Quite frankly, I thought that landing or taking off in the "amphib" *Cub* might be tricky, but that proved untrue. In the words of Mr. R. O. Romaine, Edo test pilot who flew one of the models, "No particular skill is required to take off or land."

Testing and demonstrating the amphibious *Cub* has been a lot of fun. It sure brings the boys out of the hangar when you circle the field a couple of times, drop the wheels, land and then taxi up to the line. That last is what gets them. Landing a seaplane on grass is quite common. But once down, the seaplane stays until someone gets out a dolly and wheels

the seaplane in on it. At most fields a couple of well-meaning pilots or mechanics usually rush out and hold the wings while I taxi. They won't let go even after I tell them that it isn't necessary. They see it but don't believe it.

When retracted, the gear has no effect on the hydrodynamic characteristics of the floats so, water-wise, the plane is the same as before the addition of the wheels.

I'm a landplane pilot and airport operator with many thousands of land hours, but I was thrilled and amazed with the possibilities that opened before me when I started flying this amphib. This gear should find, in addition to just plain pleasure flying, many specialized uses such as patrol work near or over water, deliveries of passengers or cargo on runs where there is a field at one end and water at the other, etc. It will, of course, present great opportunities to the hunter and fisherman who'd like to fly to his camp site.

The work on this gear is by no means over. It has been proved sound and practical, but now needs refining by competent engineers. It weighs 90 pounds at the present time—which in itself is not prohibitive. However, it has a lot of unnecessary weight which the slipstick boys can eliminate. When ready for market the gear should weigh not more than 60 or 70 pounds.

The selling price has not yet been set, but judging from rough estimates it can be marketed for around \$300, depending on production and fluctuating market prices for material.

At any rate, its cost won't be greater than the value of the extra utility it affords and, speaking from experience, it's fun flying a Piper *Cub* that can land either on land or in the water.

By R. N. DECKER



Fortune from the Sky

By HARLAND MANCHESTER

ONE evening in 1916 a couple of fighters were slugging it out in the Boston Arena when suddenly a dull explosion and an unearthly glare froze the customers in their seats, dazed the fighters,

and ended the bout. The next day fans saw in their papers one of the first night-action shots ever snapped. The credit line read "Sherman Mills Fairchild." This enterprising student editor of the *Harvard Illustrated*, precocious inventor and camera enthusiast, had rigged up a new mechanism to synchronize the shutter with the ignition of the flash powder then used; and to make results doubly sure he didn't spare the powder. The flash wore out his welcome at the Arena, but the test proved beyond a doubt that the new gadget worked.

All his life Sherman Fairchild has been inventing, improving, promoting or manufacturing an amazing variety of revolutionary products. As father of aerial photography and mapping he has changed the face of the world, and from his restless mind has streamed a never-ending procession of new cameras, shutters, sound-recording devices, newspaper engraving machines, air-cooling devices and guided missiles.

Unlike most young inventors, Fairchild had backing. His father, George W. Fairchild of Oneonta, N.Y., had risen from a \$3-a-week printer's devil to become founder and president of International



FAIRCHILD enterprises began with development of an aerial camera. Today, the name Fairchild is not only synonymous with aerial photography but it also is synonymous with successful development of cargo planes like the XC-120 Pack Plane



SURVEYS that formerly had cost thousands of dollars and taken years to complete were done from the air by this crew (left) in just a few months and at almost a tenth of the cost. Plane shown here is an early model Fairchild cabin plane



Business Machines, Congressman and publisher. Sherman was brought up in a technical atmosphere and had ample funds to develop his early ideas.

His flashlight synchronizer was not the first device to get him into trouble. On his father's place he built an elaborate water wheel, and neighbors' boys helped him dam a creek to test it. A heavy storm came up, and the dam diverted the creek and washed out a section of highway. "No more dams," ruled his father. Then Sherman spent months building a large glider in the barn loft. He was planning a test flight when his father called in an expert, who discovered that the control mechanism would not work. His father ordered it destroyed, temporarily breaking Sherman's heart but probably saving his life.

Next he designed a new fast bobsled. He found a snow-covered hill with a sunken road at the bottom. After long computations involving speed and trajectory, he decided that the sled would jump the road and continue its flight on the slope beyond. He and a schoolmate, Edward Polley, tried it and missed by a few feet, both of them breaking bones. During his months in the hospital, Fairchild rechecked his figures and found that he had dropped a zero. Ever since then he and Polley, who is now vice president of Fairchild Aerial Surveys, Inc., have double-checked their figures.

Soon after the prize- (Continued on page 50)

FAIRCHILD FC-1 was the cabin monoplane Sherman Fairchild designed and built for aerial photography. It was powered by 90-hp OX-5 engine and had top speed of 97 mph

PLANE first used for aerial photography was Fokker. Pilot was Dick De Pew (below, left). Sherman Fairchild holds camera (below, right). This was the equipment used back in 1923





NAVIGATORS on the sea or in the air must make allowances for constant currents. Similarity of tasks is shown on a chart (left) depicting water navigation and navigation in the air

IN THE AIR, the navigator (above) begins his calculations for keeping WB-29 on its weather track. He will be busy with his plotting during the entire 14- or 15-hour weather flight

By Capt. GEORGE BEHRENS, USAF

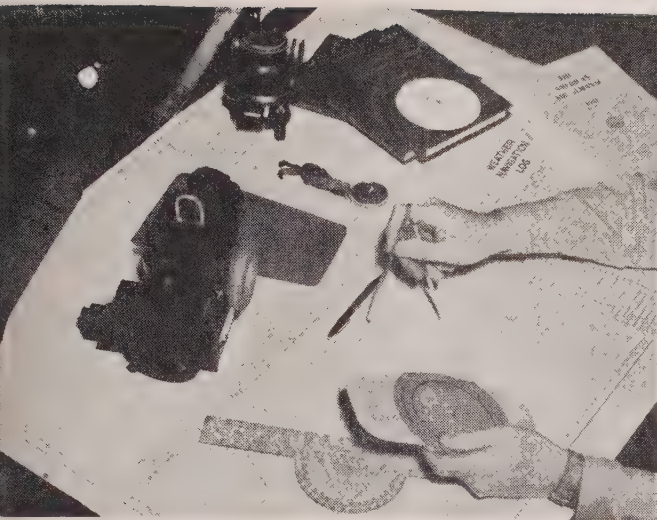
56th Strat. Recon. Sq., Air Weather Service

WHEN Christopher Columbus and other adventurers of the past took their ships and crews into the unknown realms of the "outer world," they used the same basic principle for navigation which is used today in aircraft flying in excess of 500 mph at 40,000 feet above the earth.

This principle, known as "dead reckoning," is the determining of geographical position and maintaining a desired course by applying ground speed (rate of movement over the surface of the earth)

FLAPS DOWN, 26, full power applied, and the big WB-29 Weather plane is airborne on first leg of its mission





EQUIPMENT used by navigator (above) includes Loran Chart, Weems Plotter, Sextant, Astro-Compass, E6B and Bellamy Computers, Dividers, Watch, Air Almanac, Celestial Tables

PRE-FLIGHT planning gets navigator and radar officer together to check and double-check equipment, to determine fuel consumption of plane, to calibrate instruments used on mission



and track (desired course on the compass) as estimated or calculated over a certain period of time from a known point of departure or other known position. Although the instruments of the earlier navigators were more crude than the precision instruments now used by the modern Magellans, the fundamental of navigation remains the same.

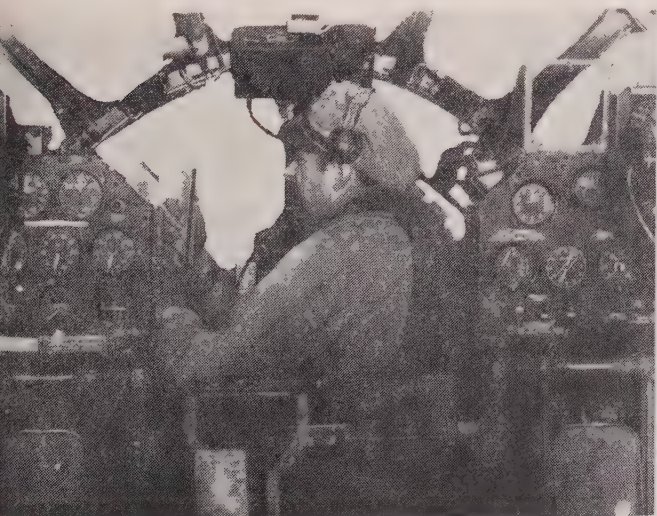
In marine navigation the navigator must make allowance for constant currents of the world's water areas to keep his ship on course and take it into port. The aerial navigator flying at speeds 10 to 30 times the rate of his ocean-going counterpart makes similar calculations for wind currents. The unpredictable wind, constantly changing with each air mass and synoptic situation, may reach extreme

velocities at high altitudes. Unless known by the navigator, these changes may get him hopelessly lost and possibly bring disaster to other members of his crew who are depending on him to get them home with fuel to spare.

This problem, encountered by every aerial navigator, is probably nowhere experienced more thoroughly than by navigators in weather reconnaissance planes.

Typical of the weather reconnaissance squadrons is the 56th Strategic Reconnaissance Squadron, Air Weather Service of the U. S. Air Force, operating from a base in Northern Japan. For the past year the squadron has been flying an average of two 3,000-mile weather (Continued on page 55)

WEATHER OBSERVER on the WB-29 sits in forward-most position, takes psychrometer (humidity) reading in flight



CHECK POINT on long over-water flights is the sun. Navigator uses Astro-Compass to get True Heading of the WB-29



Forced Landing Formula

NOT long ago a three-year-old crawled out on the windowsill of his 15th floor New York

apartment, lost his balance and plunged earthward. The horrified mother rushed down in the elevator expecting to find her son's body crumpled and broken. Instead, to her great joy and utter amazement, she found him lying virtually unhurt in a bed of low bushes.

The moral of this little anecdote is this: it isn't so much how far or fast you descend, *but how abruptly you stop*, which determines whether you'll walk or be carried when you leave the scene. If you are an average pilot, your forced-landing training probably has been meager. During flight training, your instructor no doubt pulled on the carb heat while you were in plain view of a big inviting field, shouted "forced landing" and you dipped the nose and headed her straight in. If you undershot, the instructor gave you hell. If you overshot, he gave you hell . . . and that was that. Aside from getting the usual advice to fly straight ahead if your engine ever quit on take-off, plus maybe a few more bouts with the carb heat and the instructor, your forced-landing practice was more or less complete. You took your flight test, your private, and settled down into your own personal flying habits, but you probably seldom if ever bothered really to learn forced landing technique thoroughly. You were too busy making S turns over roads, watching compass headings, peering at sectional maps and tuning the radio.

By **FRANK L. HARVEY**

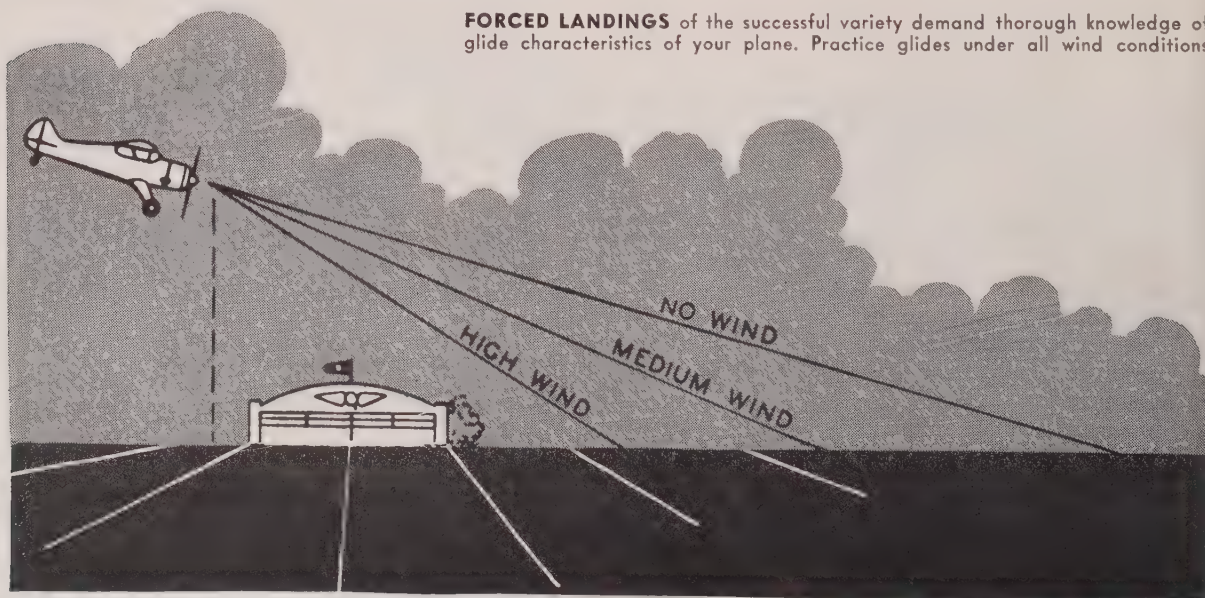
The engine always kept running. You never really *had* to make a forced landing, so you forgot the whole gruesome business.

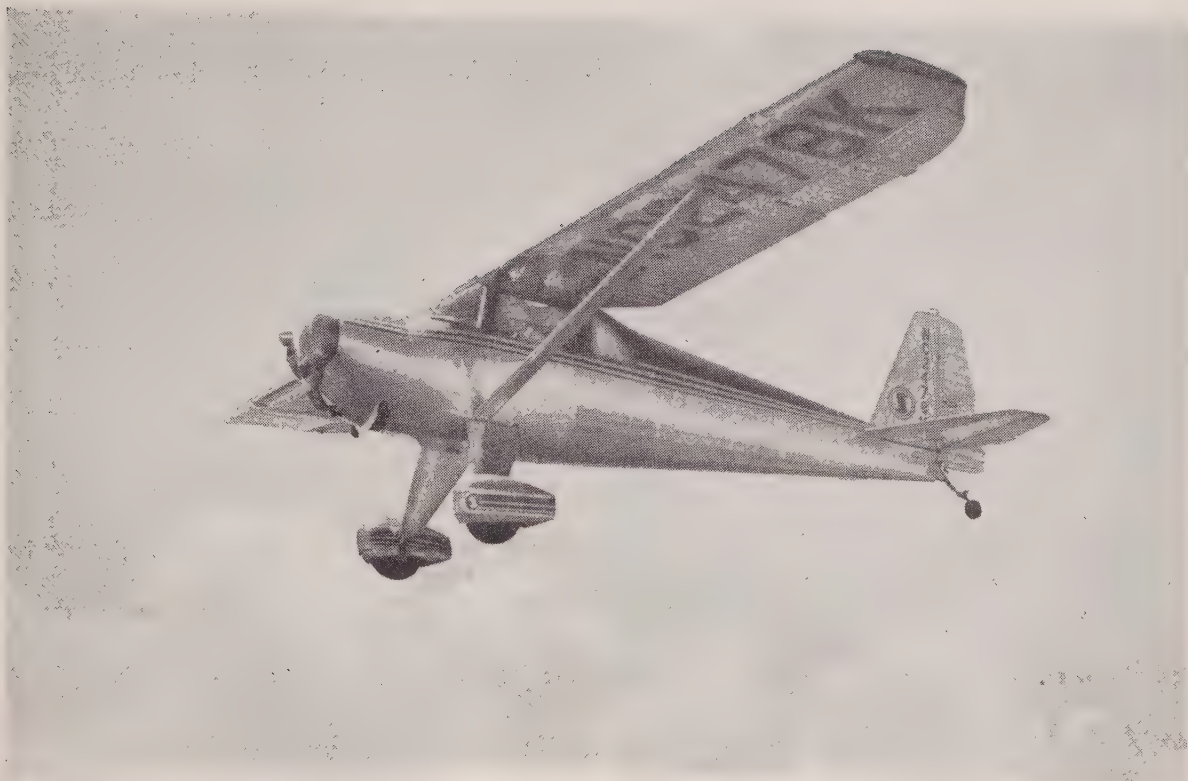
But someday—probably when you least expect it—your engine may quit, and you'll be faced with one of the most nerve-wracking experiences a pilot has to handle. If you have no backlog of experience, no clear-cut idea of just what to do, you can get pretty darned near frantic trying to spot a field and maneuver into it. The purpose of this article is to give you all the tips this writer knows about to help you make a safe and successful forced landing if you ever have one.

The first and best way to handle a forced landing is to prevent it from happening in the first place. Watch your gas. No way has yet been found to operate an engine without fuel. Keep an eye on the rpm, even when you don't think there's a chance of carburetor icing. Make a thorough line-check and end-of-the-runway check before you take off. Drain some gas out of your gascolator to make sure there's no dirt or water there. Check your oil. Look over the whole plane for defects. And finally, when you get upstairs, don't push the throttle up against the fire wall and leave it there. At high altitude you won't get any extra speed sensation. All you'll get is more noise and you'll be greatly increasing your chances of a forced landing by overstraining the engine unnecessarily.

No matter what you do, however, there are a certain number of broken crankshafts, dropped

FORCED LANDINGS of the successful variety demand thorough knowledge of glide characteristics of your plane. Practice glides under all wind conditions



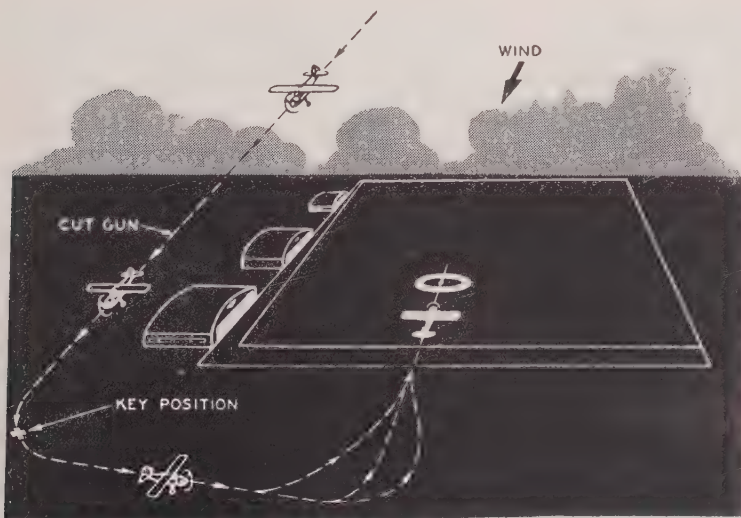


FLIGHT SAFETY demands that pilots on cross-country flights keep sharp and constantly eye out for emergency landing fields

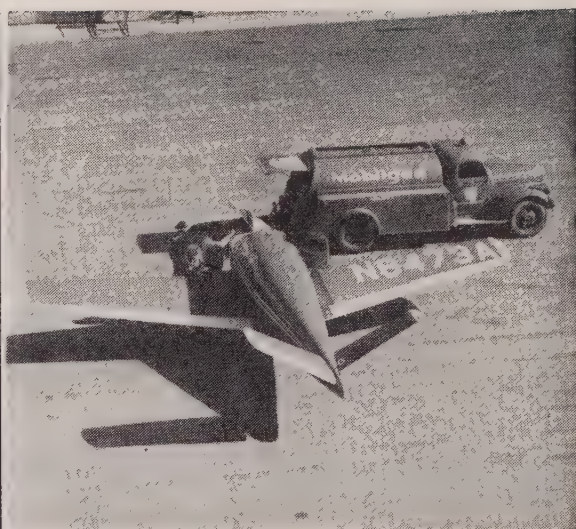
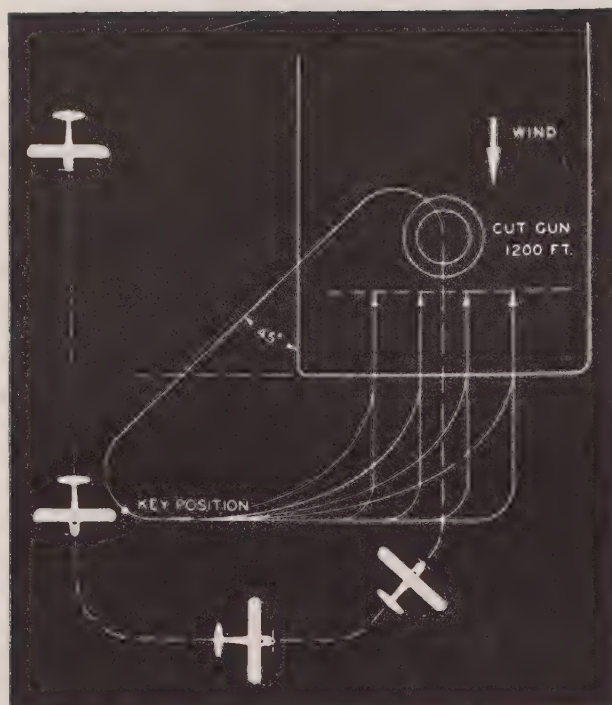
valves, leaky carburetor floats, and pilot oversights so let's get down to business and start with the worst (and one of the most common) types of forced landings—the one when your motor quits on take-off. The standard advice—“*go straight ahead no matter what!*”—is still good. I have a Mooney M-18-L, which is a climbing fool, and I thought that I could probably turn around and get it back into the field if I should have an engine failure on take-off. I went up to altitude, put the Mooney in a

70-mph wide-open climb, pulled on carb heat, took a look at the altimeter, and chopped the gun. I lost just 350 feet in making the downwind 180° turn. Knowing that I usually have at least 400 feet when I cross the boundary of the Morristown, N. J., airport where I base my plane, I figured I could get the Mooney back in. I tried it. I racked the Mooney around 130° from my original heading when I was so low I had to pour on the coal to keep from going into the Jersey swamps. In short order I found out what I did at altitude I *couldn't* do on the deck.

APPROACH, 180° kind, is started when you are flying downwind along edge of emergency field at altitude of 800 feet. You make 180 to head into wind



There are several reasons. One is the air up at altitude is smooth and steady, not gusty and turbulent, as it often is down low. Then, too, there are usually layers of air near the ground which are traveling at different velocities. These are called gradient winds. You may have a 10-mile breeze on the runway, while 50 or 100 feet up you may hit a 15- or 17-mile breeze, and still higher you may hit a 20-mile breeze. If you are trying to return to a field and have the airplane almost stalled, these gradient winds are murder. Sink out of a high-velocity layer into a low-velocity layer when you are about stalled



SPOT LANDING, 360° approach, is started flying upwind at 1,000 feet altitude over circle in which you wish to land. Last part of approach is same as 180° type made from 600 feet up

EMERGENCY LANDINGS are, for most part, result of carelessness rather than aircraft or engine failure. Running out of gasoline is common cause. Be sure you gas up before take-off

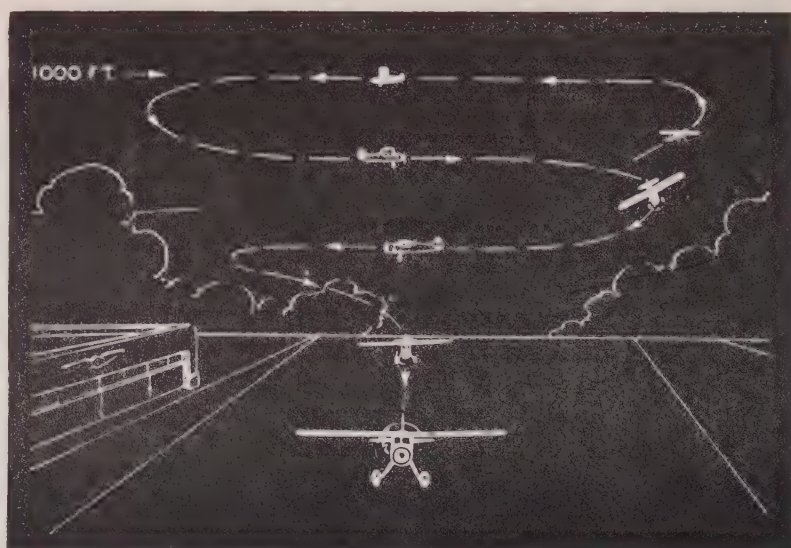
and the plane *stalls itself*. A stall at this altitude is the really killer stall. It's easy to pop the stick forward and gain flying speed when all you have under you is pale blue air. But it's quite another business to pop that stick forward when the concrete runway is leaping fearsomely into your face. I seriously doubt if I could resist the automatic stick-back reaction at this point. I doubt if you could either. And remember, the instant you pop that stick back when you have the airplane stalled, you bring on stall No. 2, a far more vicious stall than No. 1. It's usually stall No. 2 that gets you. So don't get yourself involved in the affair at all. It's messy.

Another bad feature about returning to a field, assuming you could, is the fact that you'll be riding a tailwind. The breeze that helped you into the air will now be ramming you into the ground. Pile 15 or 20 mph on your normal stall speed and you've got a lot of velocity. You hit four times as hard at 30 as you do at 40.

All right, you say, I'm sold. But if I can't get back into the field, what should I do? First of all, know your airport. Go up and fly around it and look at the ends of the runways.

S-TURN APPROACH is best one to use in high wind, can be made from any altitude but 1,000 feet is good height from which to practice. Start on downwind side

Figure out just where you'd set her down if you had a power failure on any given runway. You have some leeway. You don't have to hold an absolutely straight heading. Usually, by the time you've reached the "point of no return" you can angle off into any part of the forward 180° circle. In other words, you can pick any spot 90° to right or left, and drop into it. The beauty of casing the airport before you have an emergency is that your big basic decision is already made. You *know* the spot you'll land in, and you don't have to waste any of your precious split seconds in agonizing brain cudgeling. You can concentrate on the actual landing: getting your wheels up if you have retractable gear (it's a good idea to make *(Continued on page 48)*)



Movable-Wing

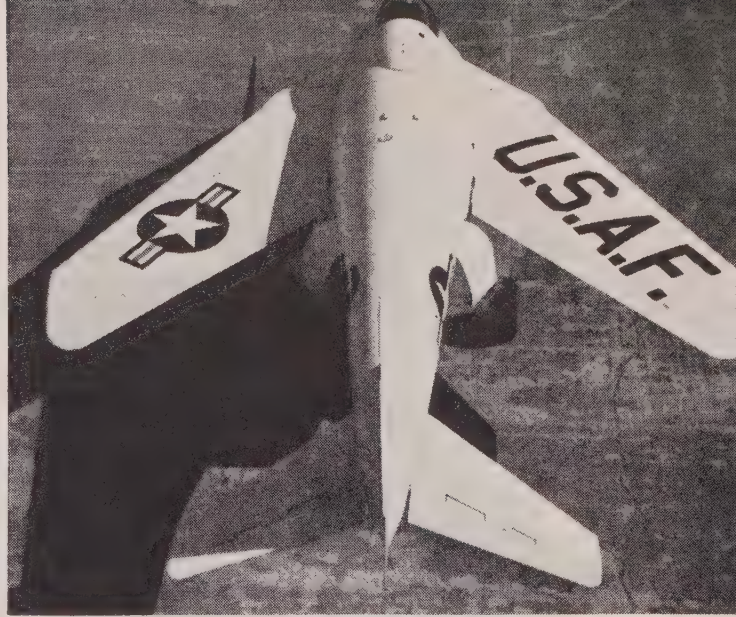
Bell X-5

THE Bell X-5 research aircraft has begun its flight tests at Edwards AFB, Muroc, California. Designed to investigate the effects of wing sweepback in transonic flight, the X-5 will be used as a flying laboratory by the National Advisory Committee for Aeronautics (NACA).

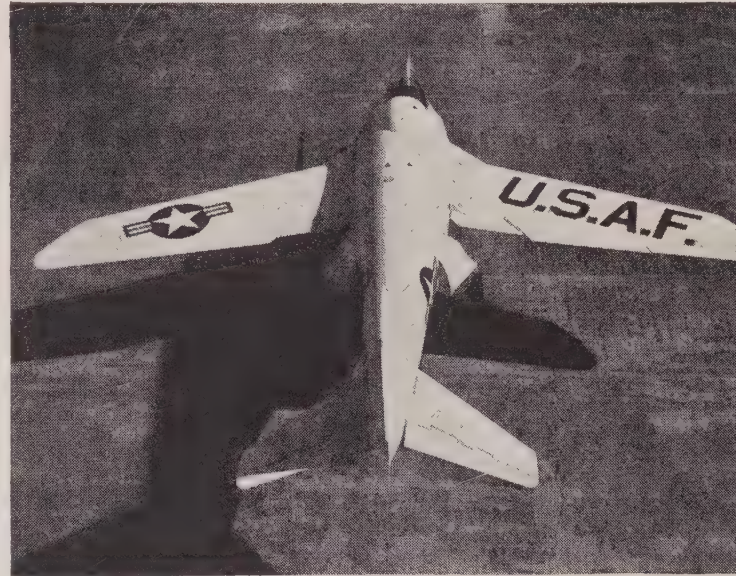
Feature of the X-5 is its wing design, an arrangement which permits the sweepback angle to be changed in flight. Each wing has a specially designed fairing to insure the leading edge presents a smooth airfoil regardless of angle of sweepback. The leading edges are fitted with slats which comprise an integral part of their upper surfaces when not extended. When extended, the slats increase aerodynamic lift and reduce stalling speed. The mechanism for changing the angle of wing sweepback while simultaneously compensating for the resulting shift in the center of gravity was developed by Bell engineers.

Two dive brakes are located in the sides of the fuselage forward of the cockpit. These brakes are metal "doors" which can be opened hydraulically until they are at nearly right angles to the fuselage. Opened, they provide rapid deceleration.

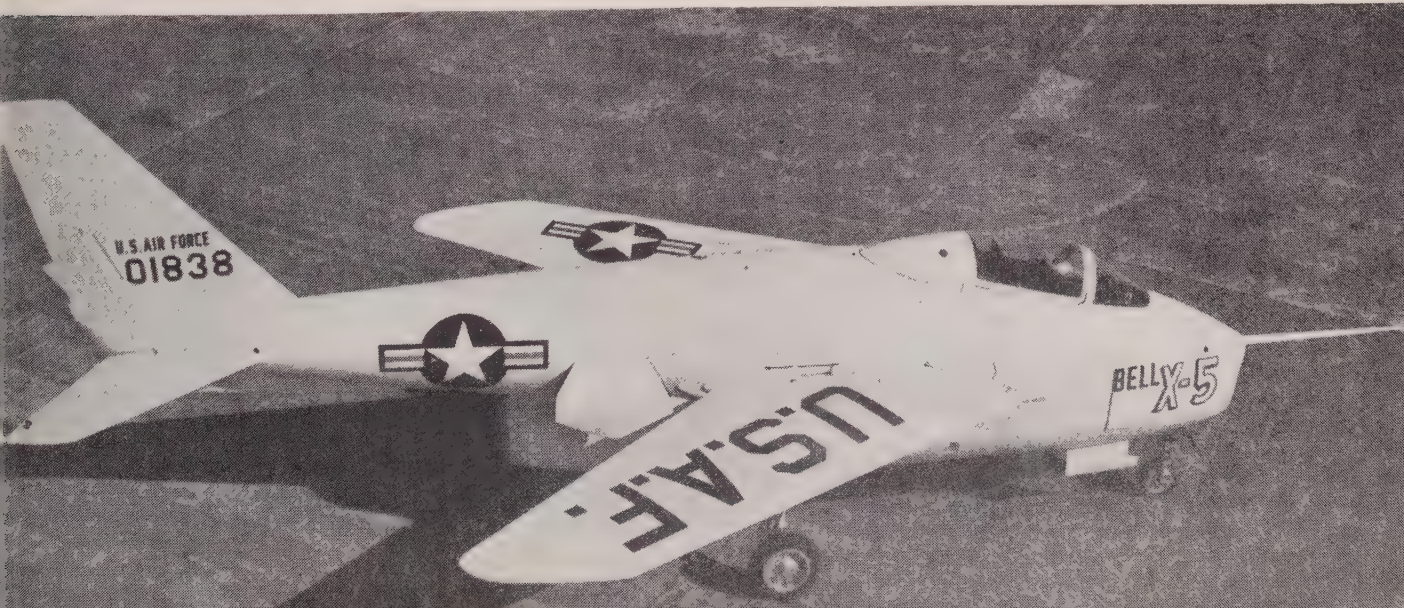
The X-5's axial flow turbojet engine, Allison J-35-A-17, is mounted under the cockpit instead of behind the pilot, and (Continued on page 43)



WING SWEEPBACK of the Bell X-5 may be changed in flight. For greater speed at high altitude, wing sweepback is increased (above). For take-off, climb and landing, best performance is with wings in the forward position (below)



BELL X-5 is now at Edwards AFB for flight testing. Plane is powered by an Allison J-35-A-17 mounted under cockpit



Airways Down-Under



TODAY and yesterday sit side-by-side on airport at Sydney, Australia. "Southern Cross" (above right) made first trans-Pacific flight in 1928. Its companion (above left) is a DC-6 trans-Pacific airliner that flies the British Commonwealth Pacific route from Sydney to Vancouver



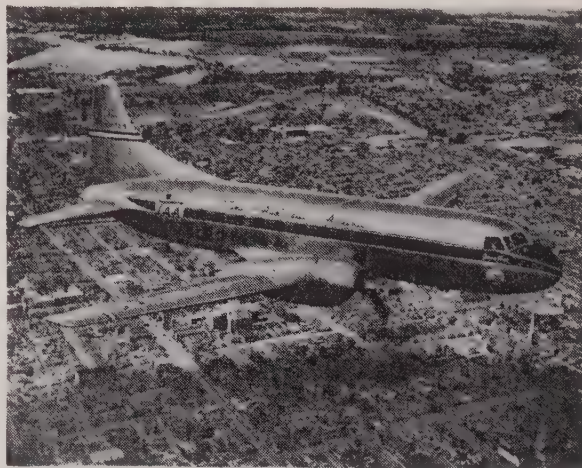
CREW of the Southern Cross that made air history back in 1928 included (left to right) Jim Warner, radio operator; Charles Ulm, copilot; Charles Kingsford Smith, pilot; and Harry Lyon, navigator. This photo was taken at the successful completion of that first trans-Pacific flight 23 years ago

Barnstormers with courage, enterprise founded Aussie air network

By NORMAN BARTLETT

At Sydney, Australia's Kingsford Smith Airport one chilly day last winter a four-engined Canadian Pacific Airlines *Canadair Four* (DC4M2) flattened out over Botany Bay and ran smoothly to a standstill outside the operations tower. A new Canada-Australia air service had been opened, the third trans-Pacific air service now operating. The other two are British Commonwealth Pacific and Pan American. In a hangar close by rested a Fokker

TRANS-AUSTRALIA AIRLINE operates fleet of Convair 240's. This TAA Convair is shown in flight over Melbourne



F-VII—a museum piece alongside the giant *Canadair Four*—in which two Australians and two Americans had made the first trans-Pacific flight just 21 years before. It was Sir Charles Kingsford Smith's famous "Southern Cross" which blazed the way for British Commonwealth Pacific, Pan-American and Canadian Pacific. The "Southern Cross" took 83½ flying hours to cross the Pacific. Today, BCPA DC-6's fly the Southern route twice a week on schedule in just 29 flying hours.

The fortnightly Sydney-Vancouver run adds another link to a vast network which makes Australia one of the most air-minded countries in the world.

The country also offers inexpensive travel. The Melbourne-Sydney fare is a shade under 3d. (4 cents) a mile, compared with the New York-Washington rate of slightly less than 4d (5 cents) a mile. As a result, a greater percentage (17.8) of Australians fly than the people of any comparable country.

Last year, Australian domestic airlines flew 234,931 hours over 35,717,364 miles (49,321 scheduled route miles), carried 1,366,644 passengers and 31,719 tons of freight. In addition, Australian-operated or partially operated international services fly over 1,135,000 miles (23,975 scheduled route miles) each three months in a year. Early this year the Director-General of Civil Aviation, Air Marshal Richard Williams, announced a 31 per cent increase in passengers carried and nearly 70 per cent in freight loadings.

When Kingsford Smith flew the Pacific 23 years ago, you could have counted Australia's civil aircraft on your fingers. Now there are over 700 on the civil register, including DC-6's *Constellations* and *Convairs*. Kingsford Smith was one of three pilots in Australia's first airline—a 1,200 mile route from Derby to Geraldton in Northwest Australia—in 1922. There are now about 400 pilots employed by 17 Australian-based domestic and international air services. Two of these services, Australian National

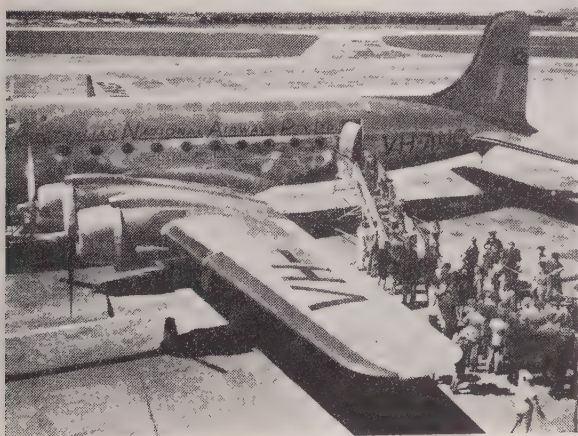
Airways and Qantas Empire Airways, last year held first and third positions among world airlines in passenger load factor ratings. These load factor figures were provided by the Aviation Research Institute of Washington, D.C. and are some indication of the remarkable growth of Australia's airline industry.

Figures, however, are only the bony structure of Australia's aviation achievement. Behind them is the real story, a story of superhuman effort. There was Smithy, as everybody in Australia called Sir Charles Kingsford Smith, flying the "Southern Cross" through a blinding maelstrom of wind and rain which smashed his windshield and flooded his cockpit; there was Captain Patrick G. Taylor, in a later trans-Pacific flight, climbing onto the port wing to reoil the engine high above an angry sea; there was the lonely Bert Hinkler breaking all solo records in his tiny Avro *Avian* in the first solo England-Australia flight.

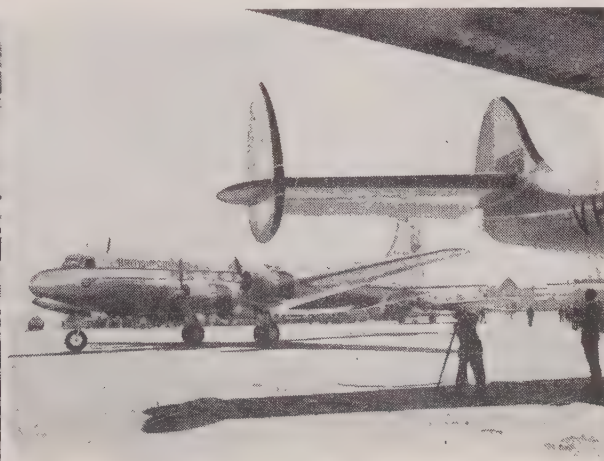
All these men, and many others like them, were ex-war birds. In 1918, two Australian Flying Corps pilots—Captain Ross and Lieutenant Keith Smith—made the first England-Australia flight in a Vickers *Vimy*. Two others—Lieutenant Ray Parer and Lieutenant J. C. McIntosh—made history with an epic flight over the same route in a De Havilland 9 biplane. Before long, Smithy and Hinkler (who was in the Navy Air Arm) achieved world fame and died as young men for their faith in the future of the world's airways.

Meanwhile, less spectacular personalities among the ex-war birds were laying solid foundations for Australia's airways. In Western Australia, Major Norman Brearley organized the first Australian airline in 1922. About that same time P. J. McGinnis and Hudson Fysh, DFC, began the Queensland and Northern Territory Aerial Services Ltd. (Qantas) with a 560-mile route between Charleville, Longreach and Cloncurry in (Continued on page 53)

AUSTRALIAN NAT'L AIRWAYS, a privately owned company, was founded in 1936. Its fleet consists of DC-6's



AIRLINES maintaining regular trans-Pacific schedules are British Commonwealth, Pan-American, and Canadian Pacific





AIR CONTROL GROUP guards the skies. Electronic eyes watch out for enemy planes, then Controller directs interception

AIR CONTROL GROUP

CONTROLLERS, plotters watch progress of enemy interception by Marine combat air patrol unit



By M/Sgt. FRED G. BRAITSCH

SEVEN glowing white specks appear on the edge of the radar scope. The radar operator adjusts a couple of dials, then calls out, "Bogies at 280, FIVE EIGHT miles."

His information electrifies the darkened room. "Give me a fix on them," shouts an officer.

The command brings cryptic replies. "Looks like about seven bogies, probably fighters at 10 thousand on course 170—speed 180 knots—now at 50 miles."

While a plotter marks a red X for the bogies' location on a plotting board, a controller calls his information into the Tactical Air Control Center of Marine Air Control Group-1. "Binder! this is Chop Suey, we have seven bogies—" and he repeats the speed, direction and distance of the intruders.

Electronic eyes of a Marine Ground Control Intercept Squadron, scanning the sky, have seen an enemy formation approaching the big Cherry Point Marine Air Base. The Squadron intercept center now directs the Marine fighter planes to make the interceptions of this enemy.

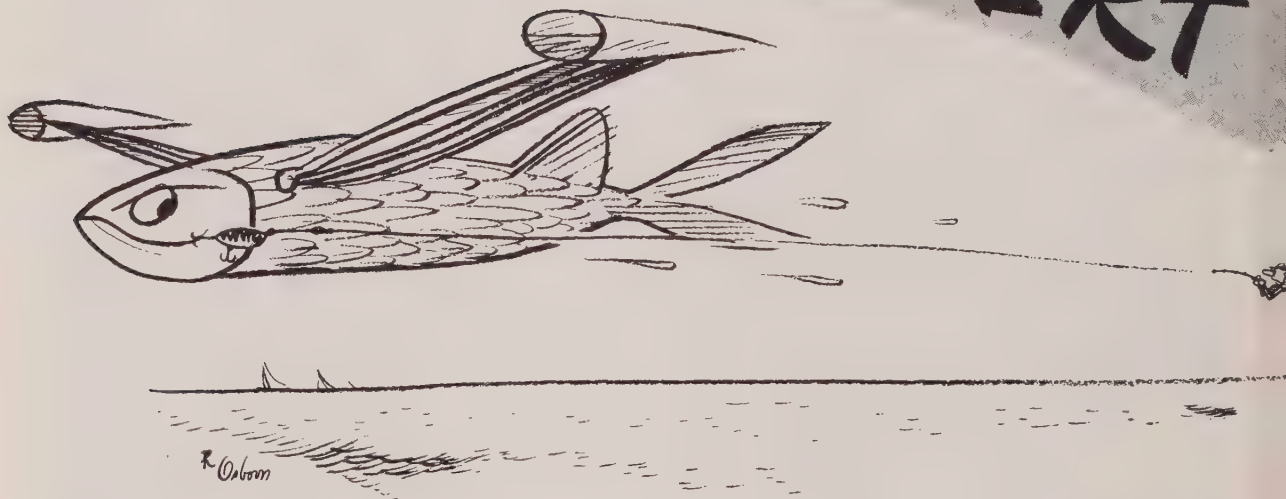
A squadron air controller radios the bogies' position and direction to the Combat Air Patrol. The CAP is friendly aircraft flying aerial guard duty above a defense area for interception purposes. They are directed to make the kill. As the CAP heads for the reported enemy position, a series of yellow O's appear on the (Continued on page 52)



ELECTRONIC GEAR must work, so M/Sgt. White (above) checks circuit of a faulty radio. Training key personnel is primary mission of Air Control Group. Capt. Hewitt, Col. Lawrence, Maj. Fraser (below) plan ACG defense training



DILBERT



By S. H. Warner and R. Osborn

Too Late! Too Late!—A parachute is added insurance that, one way or another, you will make a happy landing. So when you wear one, wear it buckled up and ready for use. Some emergencies arise so suddenly you have to jump right now. And it's an awfully silly feeling, after you have jumped right out of your chute, to look up and see it floating down some distance behind you.

As long as you are going to wear a chute, you might as well wear one that fits. If you always wear the same chute, you should have it checked by being suspended in your harness. The following faulty harness fits will thus be readily detected:

1. Improper location of the chest strap which allows the hardware to strike the jumper's chin during the opening shock. This is apt to bring tears

to your eyes, and may obscure the beautiful scenery on the way down.

2. Improper adjustment of the back strap so that you cannot sit back in the harness sling. A comfortable seat during descent might help you dope out a better alibi.

3. Improper location of the shoulder strap adapters may also prove uncomfortable.

4. Incorrect adjustment of the leg straps may result in serious injury on opening shock. It might be a mighty tough walking back to civilization on a busted femur.

Loose leg straps present another danger perhaps best illustrated by the famous story of a tough parachutist jumper. During a mass jump he had a bit of trouble getting his chute to open. Everyone heard a deep bass voice yelling, "★X?!!" Finally his chute blossomed open. There was silence—then followed by a scream, and then in a high soprano came one word, "Ow!"

(Continued on page 56)





R. Osborn

"Cloud-riding is for newlyweds! Smart pilots don't butt their noses into the ethereal until they're in the hangar"



NAVION, owned by Northern Transportation Co., is used for inspection of company trucks on the road



EXECUTIVE Twin-Bonanza was designed especially for corporate use; seats six, has 1,000-mile range

By N. F. SILSBEE

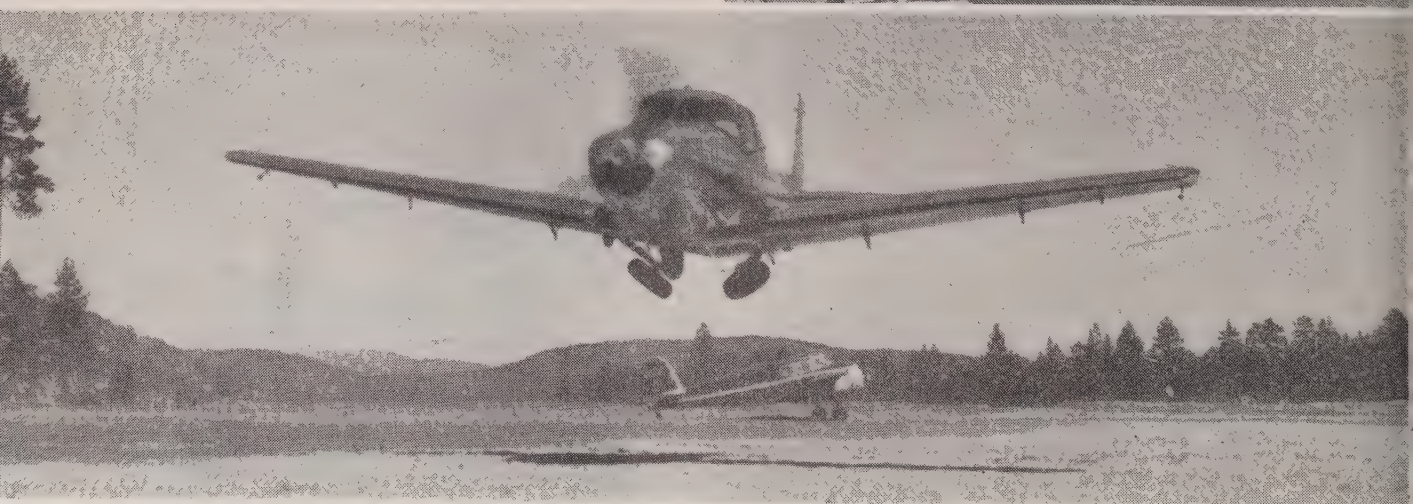
Exec. Secy., CAO A

HIGH-UTILITY AIRCRAFT such as the Cessna 195 (left), shown here on floats, *Navion* and *Bonanza* are preferred by many companies, who would rather have three of them to one DC-3 type or Twin Cessna

Ten years ago it would have been quite a job to locate and identify more than a few hundred airplanes owned and operated by corporations for normal business use. Of these, many were purchased and operated largely for advertising and publicity value. Multi-engine aircraft such as Lockheed 10's and 12's, Beechcraft 18's and Cessna T-50's were very much in the minority. The majority were single-engine Wacos, Howards, Fairchild 24's, Stinson *Reliants* and similar models.

A recent survey and tabulation by the Corporation Aircraft Owners Association reveals that today there are more than 8,000 aircraft owned and operated by American business firms and that nearly 1400 of them are multi-engine planes.

The big expansion came at the end of the war when a considerable number of AAF and Naval air transports became available through War Surplus. Several hundred military transports of the DC-3 (C-47) and *Lodestar* (C-60) types were converted to corporation use by means of re-designed luxury interiors, soundproofing, air-to-ground radiophone, etc. Companies requiring faster transportation purchased and modified a number of such bomber types as the Douglas B-23 and B-26, Lockheed PV-1 *Ventura* and North American B-25. A fair number of the smaller utility transports and aircrew trainers of the Twin-Beech type were also





Aircraft For Business

TECH D-18-S has long been a popular business aircraft. In the executive fleet of some 1400 twin-engine

modified for executive use, plus a hundred or two twin-engine Cessnas.

A further boost to this significant development came when Beechcraft brought out an improved postwar Model 18—the D-18-S, with Pratt & Whitney Wasp Junior engines, and the D-18-C with Continentals. More than 500 of these have been produced to date, some 400 of which are now flying in U.S. airways in corporation service.

In the twin-engine amphibian field the popular Grumman Widgeon has been widely used by business firms for some years, and more recently the larger, more luxurious Mallard, of which some 50 were produced; approximately 35 of these owned and operated by American business firms.

The extent of this multi-engine company fleet has been an eye-opener to many well-informed aviation leaders, including not a few in the armed services and Government agencies. It may be of interest, therefore, to summarize by models the results of the CAO A survey:

Converted transports:

DC-3C	222
Lodestar	146

planes, there are 604 D-18's, 222 DC-3's, 146 Lodestars, 120 Twin Cessnas, 113 Grumman Widgeons

Converted bombers:

B-23 (17; B-26 (25); PV-1 (10);	
B-25 (13)	65

Twin Beechcrafts 604

Grumman amphibians:

Goose (16); Widgeon (113); Mallard (36) 165

Older models:

Lockheed 12A	28
Twin Cessna	150

Total 1,380

Included in this total are nearly 300 aircraft registered in the name of individuals, a large proportion of which are used as corporation-operated planes. There are also about 100 owned by aviation service companies, and these are largely used for charter work in connection with business operations similar to that done by the companies owning and operating their own planes.

During the past three years the corporation aircraft fleet has been tremendously augmented by several models of de luxe four-place single-engine airplanes. These include the Ryan Navion, Beechcraft Bonanza and (Continued on page 40)

SKYWAYS for BUSINESS

**News notes for pilots and owners of
the 8,000-plus airplanes for business**

PAC Establishes New Division for Business Planes

A new division for the general overhaul and maintenance of corporate aircraft has been established at the Pacific Airmotive Corporation plant at Burbank, Calif. This new division has been created to offer a more concentrated, specialized and streamlined service to executive plane operators. In announcing the new division, Thomas Wolfe, president of PAC, said, "We have always, since inception, serviced private and corporate aircraft on a large scale, but with the expansion of our services, we carried out this function on an integrated basis. Constant heavy orders and demands have made it necessary to create this new division so that we may render even finer and more specialized service than that which through the years has given PAC the top rating in this field."

PAC is the distributor for Pratt & Whitney, Bendix, B-G and Champion spark plugs, Goodrich equipment and many other companies.

Chester Keasling, a veteran in aircraft service, has been named to head up the new department.

Sinclair Oil Company's DC-3 Gets Executive Conversion Treatment at Spartan Aero

If you see a white DC-3 trimmed with green at your local airport, that'll be the Sinclair Oil Company's newly converted executive Douglas. The conversion job was done by Spartan Aero Repair at Tulsa, Oklahoma, and praises for the ship's looks as well as perfection of work are being heaped upon the workmen at Spartan.

The interior of the DC-3 is done in green and brown, with light green headliner panels running lengthwise of the cabin to give the illusion of greater length. Side panels of darker green with pleats running lengthwise blend with the headliner and contrast nicely with the brown carpeting. Two full-length couches, four single swivel chairs and two double chairs give adequate seating for 14 passengers. Both direct and indirect lighting are used in the cabin. The forward bulkhead has a mural in oil painted on it, and the rear bulkhead is papered with imported English wallpaper. The pilots' cockpit is green plastic-paneled.

The Sinclair insignia appears on the fuselage just aft of the cockpit windows, and from this insignia the green trim band leads back at window level to the tail.

All of the work on the Sinclair conversion was done within Spartan's own shops, nothing was farmed out to sub-contractors. Control cables, wiring and other systems were laid out in such a manner that inspection and maintenance on the Sinclair DC-3 can be easily accomplished . . . a fact of extreme importance to those who operate in the front office of the plane.

Don't miss a chance to take a good look at this DC-3 if it flies in to your field.

Lockheed PV-1 Ventura Becoming Popular Plane for Corporation Use

Spartan Aero Repair has established leadership in conversion of the Lockheed *Ventura* PV-1 to a swift comfortable aircraft for executive transportation. Five complete conversions and seven licensing projects have been completed to date and another is now being converted by Spartan Aero Repair for the Quaker Rubber Co.

Built along lines similar to the Lockheed *Lodestar*, the PV-1 *Ventura* is a larger and heavier airplane powered by Pratt & Whitney R-2800-31 *Double Wasp* engines, developing 4,000 hp for take-off. The airplane, certificated by the CAA for a gross weight of 31,000 pounds, has a fuel capacity of 1,070 gallons offering eight hours of flight at cruising speed with a payload of 12 passengers. At normal power setting the PV-1 cruises better than 275 mph at 10,000 feet. No other airplane of comparable size and performance gives the spacious luxury of a converted PV-1.

Dresser Industries of Cleveland put the first Spartan-modified PV-1 into service in 1947. The tremendous success of this first conversion brought a demand for more. This first airplane was the only PV-1 available from war surplus in the United States but others have been obtained from RCAF surplus in Canada.

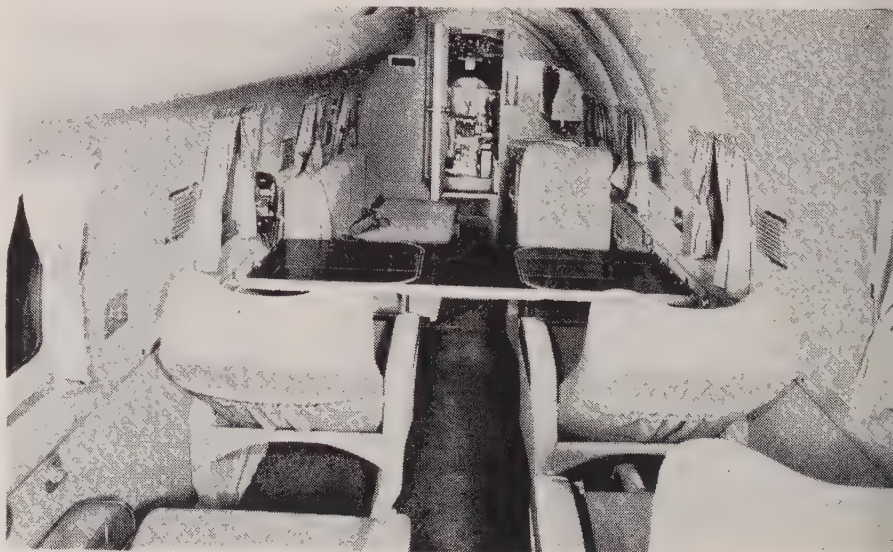
Conversion of the PV-1 from service to civilian use involved many design changes in the fuselage and the various operating systems. Forty-five engineering changes, numerous static test reports and complete stress analysis for every structural change were submitted by the engineers and fully approved by the Civil Aeronautics Authority.

Of prime importance to pilots are the appointments of the cockpit, particularly the arrangement of the instruments. The instrument panel was designed to meet the requirement of all-weather flying. Tailored to fit the preference of the pilot, all Spartan-designed panels contain a dual set of flight instruments, an electrical and a vacuum group. Electrical gyro-horizons have heated dial glasses to insure fog-free operation. Engine instruments are center-mounted for maximum utility by both pilot and co-pilot. All major systems include panel warning lights.

Of the five PV-1's converted to executive transport, three are equipped with Sperry A-12 autopilots coupled with automatic approach control. Champion Paper Company's conversion also has a Sperry engine analyzer. This instrument, by recording engine vibration and electrical impulse, makes it possible to keep a constant check on the performance of each engine.

To be a passenger in a converted PV-1 is an experience in true luxury. The entire airplane interior is finished with durable fabrics of the highest quality blended in color and tone for the most in eye comfort. Passengers have access to individual lighting and ventilation while riding on airfoam cushioning. Individual speakers for the cabin radio are installed. Folding tables provide space for work or play. Ship-to-shore radio telephone is available for executive convenience, and the same instrument is used for passenger-to-crew communication. Cabin heat-

CABIN of the executive-converted PV-1 features individual lighting, ventilation, air-foam cushioning, folding tables, etc. This executive PV-1 is owned by Champion Paper Co.



ing, both on the ground and while airborne, is conveniently controlled by a cabin thermostat. Facilities are available for hot meals aloft, as is refrigeration for long-time storage.

Pilots and passengers have been amazed by the power and comfort of the PV-1. The airplane has no bad characteristics, can be flown in and out of small fields, and operates with ease on a single engine in simulated engine-failure tests.

As the military PV-1 distinguished itself in delivering destruction to the enemy in war, the civilian conversions are distinguishing themselves in the transportation of America's top business executives, swiftly and comfortably.

Ryan, Lycoming Service Team on Nationwide Tour to Air and Ground Check Navions Free of Charge

Navion owners in the Eastern and Central states who want their airplanes checked by servicemen from both Ryan and Lycoming should contact their *Navion* dealers immediately. The 1951 nationwide *Navion* sales and service tour, a series of six three-week *Navion* service clinics, has already been completed for the Rocky Mountain and Great Plains states, and Texas and Louisiana. At press time *Navions* in the Atlantic Coast and Deep South area were being ground and air checked by Ryan and Lycoming men. This service, offered free of charge to *Navion* owners, was started in 1950, and has proved so beneficial it was decided to make the tour a yearly program.

Shell Develops New Grease

A new extreme-pressure grease that guarantees proper lubrication of aircraft gears and actuators at temperature extremes (from 65° below zero to 250° above) has been announced by Shell Oil Company.

With planes flying higher and faster, three lubrication problems have come up: high pressures in control system components cause ordinary lubricants to fail, thus leaving dry surfaces in direct contact; temperatures of 65° below zero, encountered at higher altitudes, make ordinary grease too thin; and temperatures of 250° above, sometimes reached during peak operating periods, make many greases too thin. To ensure good performance at these extremes, Shell Oil has brought out its Aeroshell Grease 7 which maintains its consistency through the temperature range and provides complete lubrication for aircraft gears and other moving parts the instant the plane's controls are set in motion.

Ag-1 Undergoing Flight Evaluation

Manufacturers and agricultural groups are presently evaluating the Ag-1, the first plane specifically designed for crop-control flying. CAA paid Texas A & M Personal Aircraft Research Center \$50,000 to design and build the plane. Outstanding features are pilot protection, slow-flight control, excellent visibility.

. . . in the Corporate Hangar

Avco Manufacturing Company's Lockheed *Lodestar* is now out of the shop at Grand Central Aircraft, Glendale, Calif., after a major overhaul and installation of a new executive interior.

Pete Collins and Dick Watson of Republic Aviation are riding herd on Republic's DC-3, now at Mallard Industries' conversion shop at Bridgeport Municipal Airport, Stratford, Conn. When the DC-3 goes into operation as Republic's executive transport, Pete will be the pilot, and Dick, the flight engineer.

General Motors Corporation's DC-3 has had the "something new" added. In addition to an overhaul and an interior conversion, the business plane has a new instrument panel and a new radio, Electro-pane windshields have been installed in the cockpit, and the plane's exterior has been repainted. Grand Central Aircraft did the job.

Brown-Root Company's DC-3 is getting a new interior, along with the installation of 165-gallon fuel tank. Their Twin-Beech is also in Grand Central's shop for installation of an 80-gallon fuel tank in the nose, a new lining for the cabin interior and an overhead radio panel in the cockpit. Re-upholstery will come at a later date.

J. C. Garrett's executive Douglas (DC-3) boasts a new instrument panel that features Sperry navigation and control instruments. The panel, which includes the A-12 Gyropilot, Zero Reader, and H-5 Gyro-Horizon, was completed recently by AiResearch Aviation Service Co., Los Angeles. Mr. Garrett is head of the Garrett Corporation.

Dave Flannery, pilot-to-be of Bristol Myers' DC-3, and Herb Hansen, pilot of Atlantic Refining's DC-3, are at Mallard Industries overseeing the work being done on their respective ships. Thompson Products of Cleveland, Ohio, is getting a "new" executive transport, but Bob Sherrieff, chief pilot, has not as yet assigned a man to be with the plane as it goes through conversion.

Phillips Petroleum's B-26 is in the Spartan Aero Repair shop for complete modification. The engines are being modified, new radio gear is being installed, the panel is being re-designed, and all new or newly overhauled gages are being installed. At Spartan with the plane is Phillips' pilot, Truman Wadlow.

Quaker Rubber Company is about to take delivery on a converted PV-1 Lockheed *Ventura*. Feature of the plane is the installation of four picture windows in the after section of the cabin. Al Wagner is Quaker's pilot.

Note a new location for Harry M. Chase, Inc., operator of Dallas Aero Service at Love Field since 1945. The new location is at the intersection of Dallas-Garland Road and Loop Twelve, and the organization will hereinafter be known as Executive Aircraft Service, a division of Harry M. Chase, Inc., and will be actively engaged in custom designing, conversion, overhaul and maintenance.

Sohio Oil Company's Twin-Beech is in the Spartan shop for a double engine change, an overhaul job on the props, and some landing gear work.

Kewanee Oil Company's Twin-Beech is getting new thermos racks and electric fans for the cabin.

James C. Thomas, 33-year-old president of the Utility Tool and Die Manufacturing Co., Pasadena, California, has been named "Flying Businessman-of-the-Month" by Ryan Aeronautical. Mr. Thomas won the monthly award for flying his *Navion* 81 hours during March, 1951.

Mid-Continent Supply Company's Beechcraft and the Beechcraft belonging to Griffith Construction Company are undergoing landing gear modification at Spartan Aero Repair, Tulsa, Oklahoma.

E. R. Squibb Company's DC-3 is at Westchester County Airport now that Roosevelt Field has been closed.

CAOA REPORT . .



CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAO A headquarters are located at 1025 Connecticut Avenue, Washington 6, D. C.

New Chairman

The Annual Meeting of the Corporation Aircraft Owners Association was held at the Hotel Statler on June 7th, with William B. Belden of Republic Steel Corporation in the chair. Mr. Belden has been Chairman of the Board of Directors since the founding of the Association during the winter of 1946-47, and under his leadership and wise counsel CAO A has developed from a small group of companies operating a dozen aircraft to a strong national organization of nearly 150 companies which operate well over 300 aircraft in all sections of the country.

Last spring Mr. Belden announced to the Board his decision to step down from the chairmanship, but that he would complete his term as a director. Following the Annual Meeting a short meeting of the Board of Directors was held at which Cole H. Morrow, Chief Plant Engineer of J. I. Case Company, Racine, Wisconsin, and Chairman of CAO A's Technical Committee, was elected as the new Chairman of the Board. Howard L. Maurhoff of National Dairy Products Co., Inc. was re-elected as Treasurer, and N. F. Silsbee re-appointed as Exec. Secretary.

Fourth Annual Forum

From the standpoint of attendance, quality of speaking and keen interest in the discussions, the 1951 Forum was pronounced as the most successful to date. Copies of most of the talks, plus a copy of the valuable report of the Air Coordinating Committee's Operational Policy Group (Special Working Group Five—SWIG-5 for short), *Air Traffic Control and National Security*, have been sent to all members of the Association.

Highlights of some of the addresses are presented in this CAO A section for the benefit of many SKYWAYS readers who have a special interest in these problems.

Airports—Cyril ("Cy") Thompson, Executive Secretary of the Airport Operators Council, was the first speaker, with a talk on "User Groups in High Traffic Density Airports." He said, "We are very much interested in the activities of the Corporation Aircraft Owners

Association, and through contacts with your Washington office, we are getting many ideas about how to serve its members better. We realize that no other group of civil aircraft operators is today responsible for so much of our nation's defense industry output and potential. We want our airports to meet your requirements and to provide service that will merit approval . . .

"Civil airports, open to public use, have been developed to serve the community in which they are located. When the community's primary interest becomes defense, airport operations must reflect that community interest. And airport use in the defense effort means many things other than use by strategic and tactical military aircraft. In fact, since this nation has many airports developed for exclusive military use, it seems that only under very urgent and unusual circumstances should use of our civil airports be required by the military. The operation of aircraft on your CAO A membership list may at times be far more important to the national welfare than will certain military operations at many civil airports."

AF and Civil Flying—J. Parker Van Zandt, Deputy for Civilian Aviation, USAF, then outlined some of the problems in connection with "The Air Force and Civil Flying." He stated that the Air Force fully recognized the essentiality and "defense-supporting" character of company-operated airplanes in American industry. The high professional standards and unique versatility of the corporation pilots are also recognized; many of them are in the organized Reserve, but where possible many have been deferred or delayed because of their present status as engaged in a "critical occupation."

Air Defense—Joseph D. Blatt, Chief of the Planning Division, Office of Federal Airways, CAA spoke briefly on "The CAA and Air Defense." He said that the unnecessary grounding of much of civil aviation immediately following Pearl Harbor had an adverse effect on aviation itself, on the war effort and our national economy. As one means to preclude such action in a future military emergency, the CAA entered into negotiations with the Air Defense Command, and in June, 1950, the Joint CAA-USAF Air Defense Planning Board was set up.

"One of the first actions of this Board was to draft an amendment to the Civil Aeronautics Act of 1938, which was approved by the President in September, 1950. Its stated purpose is "To establish security provisions which will encourage and permit the maximum use of civil aircraft consistent with the National Security."

"The Air Defense Planning Board has developed an Interim Joint Plan for the movement control of military and civil aircraft entering, departing or moving within the Continental United States under emergency conditions. This Interim Plan was presented

to the various segments of the aviation industry, and coupled with a plan for the control of electro-magnetic radiation, requires the development of local operational plans which will take into consideration the peculiarities of the local terrain, air traffic densities, enroute and terminal navigational facilities and the requirements of essential military and civil traffic in the area.

"In order to assist in these local operational plans the CAA has assigned an Air Defense Liaison Officer to each active Air Defense Division. One of the major functions of these Liaison Officers is to make known to the Commanding Generals of the Air Divisions the requirements of the operators of essential civil air traffic and to be sure that the plans as drafted will meet these requirements."

Common Problems—Vice Admiral Emory S. ("Jerry") Land, president of the Air Transport Association, was the next speaker, and his topic was "Common Problems of the Scheduled Airlines and Company Aircraft Operators." In making a point that whenever any member of the aviation family improves some aspect of flying the entire industry benefits, he said, "For example, the CAO A enables corporation aircraft owners to come together in a single body to deal with regulatory groups, to further the cause of safety and economy of operations, to encourage better airport service, and to let plane manufacturers know what is wanted. In solving their own problems, they clear away obstacles that hinder aviation generally."

"Possibly the one problem of most immediate concern to both organizations at this time is the proposed decommissioning by the CAA of some 53 low frequency four-course radio ranges throughout the country during fiscal year 1952. This is the first step in a previously announced CAA program to decommission all such ranges by the end of 1954. My staff tells me that of all the segments of aviation the corporation-owned aircraft are possibly the best equipped to use the VOR omnirange. By the end of this year the majority of the scheduled airline aircraft will be equipped to rely on omnirange as a primary method of navigation."

"A majority of the other users, including the military, are not so equipped; consequently, they will be deprived of a primary method of navigation if the low frequency facilities are decommissioned, with the result that the areas in which the ranges are discontinued will require greater separation between aircraft, and a consequent reduction in the instrument capacity of the air traffic control system. Any reduction in such service is of direct concern both to the CAO A and the ATA."

"The second mutual problem which would like to discuss for a moment is the threat of "user charges" which would be in the form of a tax or assessment against the users of the Federal Airways. Such a charge, if levied, would affect both the members of your organization and the scheduled airlines from the standpoint of economics."

"We believe, and have held on repeated occasions, that aviation should not be singled out from all media of transportation for user charges on facilities which have been provided by the Federal Government. For example, there is no charge on the maintenance of the internal waterways system, light house service, or the Coast Guard ser-

...all of which have a direct bearing upon commercial transportation in this country. The suggestion that a user charge or tax could be placed on aviation is contrary to policy, precedent, and principle which has dictated this country's historical practice of developing the finest systems of transportation in the world."

Forum Luncheon—Following a break for cocktails, during which a lot of company aircraft operational chatter went on, luncheon was set up. Among the guests were Donald J. Nyrop, CAB chairman, Col. Sam Mundell of the Air Navigation Development Board, and Col. William Westlake, Public Information Officer of the Munitions Board. Delos W. Entzel, Under Secretary of Commerce for Transportation and Chairman of the Air Coordinating Committee, appeared later and addressed the Forum briefly.

During luncheon, chairman Cole Morrow made the presentation of the Corporation Aircraft Owners Association Merit Award for 1950 to Colonel J. Francis ("Jack") Taylor, Jr., USAF, Chief of the All-Weather Flying Division, Air Development Force, Wright-Patterson AFB. The citation on the bronze plaque reads:

"In recognition of his outstanding individual initiative and leadership as Chief of the All-Weather Flying Division, USAF, in the development, test, and evaluation of aerial navigation aids and instruments which have contributed to increasing safety and utilization of aircraft in all forms of air transportation."

Following the presentation and response, Capt. William D. Locke, former Flight Commander of the 35th Fighter Group of the Far East Air Forces, gave the Forum one of the best brief pictures of Korean fighting yet presented. Capt. Locke is the only USAF officer to have been captured by the North Koreans and escaped to tell the tale. He flew both piston-engine *Mustangs* and jet-powered *Shooting Stars*, and had high praise for the jets in both aerial combat and for close-support operations. He said that of the 16 Americans originally taken prisoners who were subjected to the Korean "death march," the prison camp regime and the massacre, only 45 are still alive.

Common System—The next talk was by Charles F. Horne, Administrator of Civil Aeronautics, Chairman of the ACC Air Traffic Control and Navigation Panel, and Vice-Chairman of the RTCA. He spoke on "Company Planes and the Common System," and from the subject matter of the address he could have been wearing all three hats! The talk was packed with interest for company pilots, and a lively question-and-answer period followed.

"I believe that the members of the Corporation Aircraft Owners Association have, and rightly should have, a deep interest in the Common System of Air Navigation and Traffic Control.

"Executive-type aircraft are among the major users of the Federal Airways under instrument-weather conditions. The pilots and owners of these aircraft have been leaders in equipping their planes to use the new and improved navigation devices. I appreciate this opportunity to explain to the CAOAs that I believe the Common System is, and

how it concerns every pilot—today and in the future.

"The Common System, as the name implies, is a system of air navigation and traffic control to be used in common by all who fly—military planes, airliners, corporation aircraft, and private planes. It was developed, not by the CAA alone, but by a special committee of the RTCA, which included government agencies, military and civil, trade associations, radio manufacturers and engineers, airlines and pilot groups. The list of members, alternates, advisors and observers who blueprinted plans for the Common System is a veritable "Who's Who in Aviation."

"The report of this Special Committee 31 (RTCA SC31), made in 1948, called for a modernization and improvement of our airways in two stages—an "interim program" to be completed by 1953, and an "ultimate program" with a target date for completion in the mid-1960's.

"One of the most important parts of the interim program, which is nearing completion today, is the very high frequency omnidirectional radio range—VOR, or omnirange. Some 350 of these ranges are in operation to date, out of a planned total of 450.

"The omniranges offer great advantages over the low/medium frequency four-course ranges which they will eventually replace. As most of you know, omnirange flying is relatively free from static interference. Any desired course is available instead of the limited four courses offered by the L/MF ranges. Quadrant confusion is impossible with the VOR, and flying with reference to a vertical needle is much less exhausting and more accurate than constant listening to the "dit-dah" of a low-frequency range.

"VHF communications is another important part of the Common System. All CAA facilities have been fully equipped for some time with VHF receivers and transmitters. Traffic on the VHF frequencies is increasing rapidly as aircraft owners equip their planes with the necessary airborne sets; this is paying real dividends in reliable, static-free communication, with resultant improved reliability of service. Upon RTCA recommendation, several VHF channels which have hitherto been used only by the scheduled airlines will shortly be made available to all properly equipped airplanes.

"The Instrument Landing System, with which most of you are familiar, is part of the Common System outlined by SC31, as is airport surveillance radar and precision approach radar, two functions of the wartime GCA system. We now have 94 ILS installations commissioned, out of a planned total of 176 for the continental U.S. We have only nine commissioned radar installations of each type (ASR and PAR), but 43 surveillance and 14 precision approach radars are on order.

"Distance measuring equipment (DME) operates on radar principles to provide a pilot with constant information concerning his distance from the DME ground transmitter. This distance in miles is continuously displayed in the cockpit in easily readable form.

"Ground-station DME transponders have been installed at VOR sites between New York and Chicago. Others, as fast as they are delivered, will be installed at other omniranges throughout the country. Our total program at this time is over 450. Even-

tually we also expect to install DME on airports having ILS installations. During an ILS approach, DME will provide continuous and extremely accurate information concerning the distance of the plane from the airport—much better information than is available from the present 75 mc markers or compass locators.

"Airborne DME units are not yet available for general purchase, but we hope they will be before long. The CAA is obtaining a few for testing and evaluation, and a few will be loaned to the users of the airspace for familiarization purposes. One will certainly be made available to your Technical Committee for this purpose . . .

"There are additional elements in the Common System, which I can only list in this brief talk. Among these are the Course Line Computer, the Mechanical Interlock, VHF/ADF, Secondary Radar and Transponders, ATC Signalling System, Data Transfer & Display Equipment, Airport Surface Detection Equipment and Traffic Delay Predictors. The ADF's are presently available, but the others are still under development.

"I want to emphasize that the Common System is all the devices I have mentioned, all working together. The Common System is not omnirange, it is not VHF, it is not radar—it is all the component parts working together which form the best navigation, communication and traffic control system which the world has seen to date. . . .

"The growth of company-owned aircraft is largely a post-war phenomenon. However, it was not until the Corporation Aircraft Owners Association came into prominence that many of us realized how significant this segment of aviation had become.

"This was crystallized by your Directory of Executive Aircraft, first published in January, 1950, which we were happy to send to all our communications stations, towers, etc., to help identify your planes. At my suggestion during last year's RTCA meetings, more detail on equipment was included in the following issues, and the Office of Federal Airways is now working with representatives of your Association in improving the directory still further.

"I was pleased indeed by the decision to move your Association headquarters to Washington so that your counsel and advice would be readily available to those of us in CAA. I also congratulate you on your decision to accept membership on the Executive Committee of the RTCA. We are looking forward to years of close and friendly association in our mutual efforts to foster and promote the growth of civil aviation."

SWG-5 Report—This talk was followed by one by L. W. ("Lou") Burton, Jr., Secretary of the ACC NAV-Panel, and also of the Operational Policy Group (SWG-5) appointed by that panel.

After giving background information on the Air Coordinating Committee, the NAV-Panel and its Operational Policy Group, he explained how SWG-5 undertook to produce an "operational" report which would be more or less of an equivalent to the "technical" blueprint set forth in RTCA SC31.

"The Operational Policy Group found that one of its most important problems was to discover and integrate the various facts and opinions necessary to give the imme-

(Continued on page 51)



REGISTRATION—Walter C. Pague, chief pilot for ARMCO Steel and chairman of CAOA Technical Committee, registers for Forum at Statler Hotel in Washington, D. C. With him is Col. N. F. Silsbee, CAOA Exec. Secretary, Mrs. Silsbee and Jean Howard who handled members' registration for Forum



SIGN-UP—Galen Potter of AiResearch registers for Forum while Charlie Knox awaits his turn while Bill Watt (with bow tie), chief pilot for Federal Telecommunications, looks over program for Corporation Aircraft Owners Association's 1951 get-together



SPEAKERS' TABLE—Among those who addressed the Forum were Capt. W. Locke, USAF (left to right); L. W. Burton, Jr., of Air Coordinating Committee; Cy Thompson, Airport Operators Council; Charlie Horne, CAA Administrator. At end of the table is William Belden, retiring CAOA chairman



SPEAKERS' TABLE—Also on the CAOA Forum program were (left to right) CAB Chairman Donald W. Nyrop; Air Navigation Development Board's Col. Sam Mundell; and Joseph Blatz, Chief Planning Officer, of the Office of the Federal Aviation



FORUM—In between his own meetings on the Hill, Delos W. Rentzel, Under Secretary of Commerce for Transportation, spoke briefly to CAOA members



CAOA AWARD—Winner of the 1950 CAOA Award, this year a bronze plaque was Col. Jack Taylor, USAF All-Weather Flying Div. Award was made at luncheon



USAF SPEAKER—Capt. William D. Locke, former Flight Cmdr., 35th Fighter Gr., gave CAO Forum clear picture of air activities in the war against Korean Reds



CAA GUEST—Administrator Charles F. Horne's talk to the Forum was of special interest to company pilots. He discussed navigation for executive aircraft



ATA—Vice Adm. (Ret.) Emory S. Land, president of Air Transport Association, addressed the Forum on subject of common problems of airlines and corporate planes



HANGAR TALK—Howard L. Maurhoff (left), assistant treasurer of Nat'l Dairy Products Corp., and treasurer of CAO, discusses new issue of the CAO Directory with Arthur S. Moore, Safety Engineer with Associated Aviation Underwriters



WING TALK—Charlie Horne, putting in some time these days on a private pilot's ticket, tells a funny one on himself while ANDB's Col. Sam Mundell, Col. Taylor, CAA's Joe Blatt, and Cole Morrow, CAO's new Chairman of Board, listen with fellow-airmen interest



CONFERENCE—Informal chit-chat found George Weis (center), of Sperry Gyroscope, discussing (you guessed it) "Zero Reader" with (left) Rip Strong, pilot for Nat'l Dairy Products and E. Tilson Peabody, chief pilot for the Sinclair Refining Company



CAOA CAMERA—In the CAO suite, the cameraman recorded another jovial gathering. This time it was (left to right) Rip Strong, E. Tilson Peabody, manager of aircraft operations for General Motors Corp., Ben Horchler, ad manager of SKYWAYS, and Tom Neyland, pilot for A. Trostel Co.

Aircraft for Business

(Continued from page 33)

Cessna 190 and 195. The speed, range and generally superior performance of these aircraft, plus their ability to utilize thousands of smaller airports unavailable to most multi-engine equipment, renders this class of airplane a valuable addition to U. S. air transport facilities. Their initial cost, plus operating charges, maintenance, servicing, liability and flight insurance coverage lift them out of the private-flying category. It is estimated that over 90 per cent of the 5,000-odd total of these models which have been produced to date are utilized as a valuable tool of industry or business. In many cases, in addition to the above costs, such aircraft are flown by professional pilots employed by the companies which operate them.

These de luxe single-engine planes have generally proved so reliable and economical that the aviation or transportation departments of many corporations favor ownership of two or more aircraft in this class rather than one large plane. It has been found to be more efficient to have two planes heading out in different directions with two or three passengers in each than to have one big plane going to one place with only three or four people in it. Many other companies, and this is especially true of the oil companies, have fleets of from five to 15 or more aircraft, including both multi- and single-engine, with the smaller planes used for shorter trips, inspection, etc.

To the above group should be added between four and five thousand Stinson Voyagers, Cessna 170's and the larger Pipers, many of which are employed at least part-time as company aircraft. Nothing smaller than four-place planes is included in the 8,000 figure referred to earlier, however.

The sharp increase in business flying since the end of the war is reflected in the CAA non-air-carrier total hours flown. In 1946 this total was 1,068,000 hours; in 1947 it was 1,966,000 hours, an increase of 84 per cent. In 1948 the total was 2,576,000 hours, a better than 30 per cent jump. In 1949 it began to level off, with a slight increase to 2,615,000 hours. These figures include flying by farmers, individual salesmen, etc., flying on personal business, but the CAA estimates that something over 50 per cent of the annual total is logged by company aircraft. Since the outbreak of the limited war in Korea and the declaration of a national emergency with its stepped-up mobilization effort, the proportion of corporation flying has definitely increased.

This augmented activity was shown in the CAO A survey. The corporations which formed the Association in 1947 and those which joined in 1948 and 1949 were then flying each of their aircraft an average of 400 to 500 hours per year. The survey questionnaires covered activities for the year 1950, and the average utilization was more than 600 hours per aircraft. Some were as low as 400, but many others went to 750, 800 and 850 hours during 1950. Returns from a couple of hundred non-member companies (some of which have since joined the association) also bear out this higher utilization.

A further striking example of the greatly stepped-up activity in company aircraft operations was seen in an analysis of the users of the country's high-density terminal airports.

The Airport Operators Council, Washington, D. C., made a test of all aircraft movements (take-offs and landings) in January, 1950 and in January, 1951. Scheduled airline traffic was up 19 per cent in January, 1951 as compared with January, 1950, but corporation flying was up 40 per cent.

While CAA Administrator Charles F. Horne was still Acting Chief of the Office of Federal Airways, he told a group of CAO A directors that the vast majority of aircraft using the airways were (1) military planes, (2) scheduled airliners and (3) company aircraft. A study made this spring indicated that of these three classes corporation aircraft led the parade in the matter of airborne equipment for the transition program of the new VHF all-weather airways.

The reasons for this are not far to seek. American corporations have always been willing to spend money to advance the safety, utility and efficiency of the equipment used in their business, and this has proved true of the company airplane. As the CAA completed the first batch of ILS installations and VOR stations, owners of company planes purchased the necessary airborne equipment to use them. While the Air Transport Association's engineering and operations people were putting the stuff through the necessary exhaustive tests before it could be accepted



ENGINES that power executive aircraft are given complete overhaul at Grand Central

for operational use for scheduled-airline service and purchased in blocks of 150 to 250 or more for the larger airlines, corporation aircraft operators were buying and installing the earlier versions of the Aircraft Radio Corporation and other VHF receivers and transmitters, and omnirange receivers; also war surplus ILS localizers and glide slope receivers until postwar commercial versions came into production. The Office of Federal Airways freely admits that the practical use of VOR in extended areas of the country has been pioneered by company aircraft pilots.

The same goes for such a valuable piece of equipment as the Sperry "Zero Reader." This revolutionary gyroscopic instrument provides the pilot with a simple two-element indication that permits him to fly and navigate an aircraft manually with a degree of accuracy, precision and ease that approaches the performance of automatic control. This useful flight computer was developed primarily for military and airline use, but while these groups were making up their minds about it, testing it, etc., George Wies, Sperry aviation sales engineer, sold some 30 of the Zero

Readers to corporation aircraft owners.

This increasing use by company planes of the new-type airways now going into effect has provided an important new activity for the CAO A since the establishment of its headquarters in Washington. Although not officially represented on the Operational Policy Group or Special Working Group 5 (popularly known as "SWIG-5") of the Air Coordinating Committee's Navigation and Air Traffic Control Panel (NAV-Panel), the Association has kept in close touch with the activities of this group. Through the chairman of its Technical Committee, Cole H. Morrow, chief plant engineer of the J. I. Case Company, Corporation Aircraft Owners Association was represented at several of the important technical conferences and demonstrations at Indianapolis with a view to making recommendations regarding company aircraft. These had to do with both equipment and operational procedures.

The Corporation Aircraft Owners Association has also become a member of the Executive Committee of the Radio Technical Commission for Aeronautics, whose SC-31 report set up the technical blueprint for the all-weather common system, and which the SWG-5 report is now implementing. Beginning with the June 1951 meeting a series of sessions will consider problems of electronic equipment and operational procedures which will be of increasing concern to both the owners and pilots of this country's corporation aircraft.

The Association has taken an active part in establishing the essentiality of company aircraft during the national emergency by cooperating with the various Task Groups of the Air Transportation Survey of the National Security Resources Board, headed by Dalos W. Rentzel, Under Secretary of Commerce for Transportation.

Owing to the rapidly developing shortage of multi-engine pilots, the Association has worked with the Inter-Agency Committee on Critical Occupations in placing pilots on the Critical List, and with the Air Force in seeking to get delays or deferments for company pilots in several particular cases.

CAOA is a cooperating member of the Emergency Aviation Council in connection with joint CAA-USAF air traffic control problems and procedures in a partial and total emergency, and related matters, and also keeps in close touch with Joe Geuting of the Aircraft Industries Association and Ray Gaillard, chief of the Office of Aviation Defense Requirements, in connection with priorities for aircraft radio equipment and other vital parts and components for company-operated airplanes.

Thus after three years of gradually increasing usefulness, the Corporation Aircraft Owners Association is now in a position to render vital services to all operators of company aircraft. Its blue Directory, published twice a year and distributed by the CAA is widely used throughout the country, and the CAA has suggested improvements and procedures which will make the 1951 Summer edition of The CAO A Aircraft Director still more useful.

The importance of corporate aircraft in the world of business is growing daily. The side issue fact that this growth in corporate aircraft use has resulted in an increase in the business use of commercial airlines only adds to the stature of executive flying. It is good and profitable business all around.

SPARTAN GRADUATES ADVANCE FASTER....

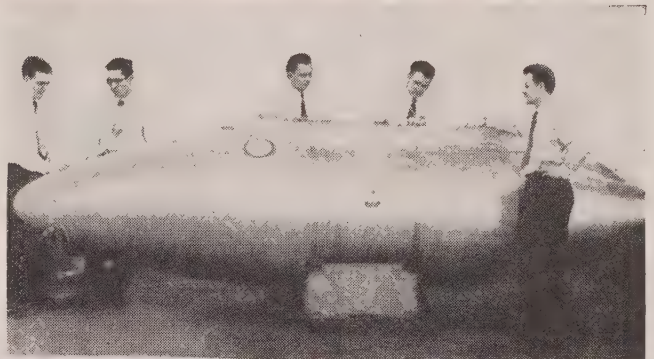
THE RECORDS PROVE —

**SPARTAN GRADUATES GET HIGHER STARTING
RATES AND FASTER ADVANCEMENT...**

While the cost of living has risen 100% the salaries of skilled aviation technicians have risen approximately 00%, within the same period of time. *This is definite proof that aviation offers greater possibilities for success to young men with ambition and sound training.*

The records of the SPARTAN Placement Department show that SPARTAN graduates receive higher starting salaries and faster advancement because they are immediately valuable to their employers. This department receives far more requests for SPARTAN graduates than are available. You can have your name on this "availability list," if you have studied diligently and have shown the necessary aptitude. You can be certain of immediate employment, upon graduation.

You must act quickly! Some important aeronautical firm wants to hire you as quickly as you can qualify. SPARTAN can help you as it has helped thousands of others. Write, NOW for complete information.



The above SPARTAN graduates are part of a group a famous manufacturer of aircraft radio and instruments has employed at SPARTAN.

The SPARTAN graduates, top photo, are part of a group one of the oldest aircraft development companies — and foremost producer of military aircraft during World War II — has employed at SPARTAN.

SPARTAN is again training men for the United States Air Force. This is your assurance that there is none better than SPARTAN training.

**GET THE FACTS . . .
LEARN HOW YOU CAN
ACHIEVE SUCCESS**



Maxwell W. Balfour, Director
Spartan School of Aeronautics Dept. S-91
Tulsa, Oklahoma

Please send your free Catalog immediately.

Name _____ Age _____

Address _____

City _____ State _____

Indicate which of these branches interests you.

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Flight | <input type="checkbox"/> Instruments |
| <input type="checkbox"/> Mechanics | <input type="checkbox"/> Aeronautical Engineering |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Airline Maintenance Engineering |
| <input type="checkbox"/> Meteorology | <input type="checkbox"/> Flight Engineer |

Spartan is approved for training under the G. I. Bill of Rights

SPARTAN
A UNIVERSITY OF AVIATION



COLLEGE OF ENGINEERING
ADDRESS DEPT. (S-91)

TULSA, OKLAHOMA

Russia's Newest... LA-17

(Continued from page 11)

tion capacity has been switched over to the manufacture of the MIG-15 and La-17 and authoritative sources indicate that assembly tempo of the latter type is now approaching 200 airplanes a month. With something like one thousand La-17's already in service with crack fighter units, it seems unlikely that the Reds will miss the admirable opportunity presented by the Korean War to give the fighter a shake-down under truly operational conditions and, although as yet there is no concrete evidence that the La-17 has *already* appeared in Korean skies, it is highly probable that this airplane will be met with by the USAF. Therefore, SKYWAYS considers it timely to attempt a preliminary over-all design analysis of this fighter, a machine embodying a combination of the archaic and ultra-modern in fighter design.

Simplicity is the design keynote of the La-17. The fuselage is a plain metal structure of circular section, making liberal use of preformed skin, with plump Falstavian contours. A large divided nose intake for the turbojet joins up aft of the pilot who is seated well ahead of the wing leading edge, close up to the nose. The canopy has a sharply swept curve with armor-glass panels in front of the pilot and a metal section, which serves to provide rear protection and maintain curvature of the canopy, at the rear of the pushback "bubble" portion.

The pilot has a superlative all-round view and the cockpit is equipped with an automatic ejector seat which is now standard on all Soviet jet fighters. Radio equipment is positioned aft of the pilot and, to judge by the single visible aerial and previous Soviet practice, consists only of a general purpose set for air-to-air and air-to-ground communications. This may well be a copy of the American Command set supplied to the Russians under Lend-Lease during World War II. This external radio mast aft of the cockpit is one of the strange anachronisms of the La-17. Little is known about instrumentation although, as the Reds believe that the fewer the instruments the fewer the maintenance manhours, these are probably elementary.

The La-17's wing is of thin section and installed at shoulder position. It features some 30° sweepback on the maximum thickness chord line—actually 32° on the leading edge—and spans approximately 40 feet. The La-17's ailerons are not unduly large or highly-loaded and are, therefore, probably not power

assisted. The small metal strips to be seen on the wing and rudder trailing edges are probably adjustable on the ground only, rather than servo or trim tabs. Ease of maintenance appears to be a consideration that has influenced many engineering decisions. For instance, there do not appear to be leading edge slots but problems of inadequate aileron power caused by spanwise flow are partially solved by employing large chordwise fences which, two to each half wing, stretch from the leading edge almost to the trailing edge.

Air brakes are fitted at the fuselage sides under the wing trailing edges and aft of the mainwheel housings. These open forward and outward to increase combat flexibility and reduce landing speed.

The vertical tail surfaces are large to the point of being grotesque, competing with those of the MIG-15 as proportionately the largest of any aircraft flying today. Sharply swept, they carry the moderately swept tail-plane well up towards the tip to avoid the wash of the shoulder-positioned wing. All tail surfaces are of generous area and although they should provide excellent stability, their clumsy design undoubtedly contributes to a reduction in the La-17's limiting Mach number. A large ventral fairing under the rear fuselage has every appearance of being an afterthought on the part of the designer. Its primary function is probably that of reducing the aspect ratio of the vertical tail surfaces, but a subsidiary role would appear to be that of tail bumper. Some of our contemporaries have suggested that this ventral fairing is actually a housing for a boost rocket. However, Intelligence photos prove indisputably that this feature is nothing more than an appendage to the vertical tail surfaces.

The landing gear arrangement of the Lavochkin is unusual in that all wheel units retract into fuselage housings. This feature leaves the wings entirely free of wheel wells and enables the use of a thinner section than would otherwise be possible. The nose-wheel retracts backward into a housing between the cannon armament and is enclosed by clam-type doors. The mainwheels, which swing downward, rearward and slightly outward are enclosed by large panels, hinged at the top beneath the wing root.

The cannon armament of the Lavochkin is installed in the lower section of the fuselage nose; one cannon being fitted on either side of the nosewheel well. Reports from various sources indicate that the caliber of the guns installed varies, some machines having two 20-mm weapons and others having one 30-

mm and one 20-mm, or two 30-mm guns.

Although we know much of the external characteristics of the La-17, the internal arrangements of this machine must be left largely to intelligent conjecture. Our knowledge of Soviet turbojet advances is meagre and, therefore, perhaps the most interesting feature of this airplane—the type of turbojet installed—is still not definitely known.

Despite its moderate size, the frontal area of the La-17 is not inconsiderable and at least 4500 pounds thrust would be needed. This power requirement, plus space considerations, rules out many known Russian developments of German turbojets, but leaves the Red development of the Jumo 004H which, in its early transitional stage when taken over by the Russians, was a development of the Jumo 004B with three extra compressor stages and a two-stage turbine. Reports indicate that this unit has been developed by ex-Junkers engineers to a satisfactory production standard and is developing a basic dry rating of some 4500 pounds thrust.

This thrust, in itself, would be insufficient to furnish a performance of today's standards and it is probable that an afterburning attachment is fitted. Again, methanol injection or rocket boost may be employed.

The turbojet is fed by a large circular nose intake which bifurcates around the cockpit. A bleed for a supply of cooling air is situated under the intake. The main fuselage tank appears to be installed ahead of the turbojet and aft of the cockpit, and additional fuel cells are presumably fitted in the wings, although space limitations restrict the size of these. The forward and rear fuselage sections appear to join up immediately aft of the rear wing intersection point, and turbojet changes and maintenance are effected by detaching the rear fuselage section.

Although there is as yet no definite confirmation of the role of the La-17, it would appear better suited for patrol and escort duties than the MIG-15 which is essentially a short-range interceptor fighter. As the Soviet Air Staff attaches prime importance to this role, plus the fact that the Reds are expending much effort on the production of short-range tactical jet bombers and that Lavochkin's last piston-engined fighter, the La-11, was intended to fulfill these duties, the allocation of this role to the La-17 would appear feasible.

Indulging in some "guesstimating" on the higher rungs of the Mach ladder, a limiting Mach number of around 0.89 would appear to be conservative and maximum speed is probably in the region of 640 mph. Service ceiling is likely to be between 35,000 and 40,000 feet and cruising duration something between two and two-and-a-half hours. Lighter all-up weight and generally lower loadings as compared with contemporary U.S. fighters possibly give the Lavochkin the edge in turn and roll rates, but present armament would appear to be inadequate and it will probably be found that the F-86 *Sabre* is a good match for the chronologically later Russian airplane.

To sum up, the La-17 appears to be a strange mixture of yesterday and today in fighter design. Ease of maintenance appears to have a consideration that has strongly influenced Semyon Lavochkin, and the design keynote is simplicity, only features that are operationally essential having been incorporated in the La-17 and complicated electronic gear, automatic slats and the host of

RUSSIAN LA-17 provides pilot with excellent 360° visibility; the cockpit has ejector seat



other refinements commonly found in contemporary U.S. fighters have been omitted with a consequent gain in all-around performance for the power available.

The greatest effect of the appearance of the La-17 has been a gradually increasing apathy among the smaller air forces of the Atlantic Pact signatories and hasty assurances from official departments that there is no immediate cause for alarm over the position in which Western Europe's air arms find themselves with regard to fighters. If there is no immediate cause for alarm there certainly is *every reason for concern*. The debut of the MIG-15 brought home to us in no uncertain fashion evidence of the progress made by the Reds in fighter design during the past few years. Can we wonder, therefore, that there are those in Italy, France, Belgium and Holland who feel that the *Gloster Meteors*, the *de Havilland Vampires* and *Venoms*, which are only just starting to roll off their assembly lines, have already been rendered obsolescent by the latest Red fighters? Should not swept-wing fighters capable of meeting the MIG-15's and La-17's on an equal footing such as the F-86 *Sabres*, the F-84F *Thunderjets*, the Supermarine 541 *Swifts* or the Hawker P.1064's have replaced these vintage designs heretofore!



Movable Wing X-5

(Continued from page 25)

it is this arrangement which gives the X-5 the "flying guppy" configuration when viewed in profile. The Allison J-35-A-17 develops 4900 pounds static thrust at sea level.

The cockpit of the X-5 is located a few feet behind the plane's nose, and its sliding Plexiglas canopy, with only a slight blister, conforms almost perfectly with the smooth contour of the fuselage. The cockpit is pressurized and air-conditioned to maintain safe and comfortable conditions for the pilot at high altitudes.

Both the cockpit canopy and the seat are jettisonable for emergency escape. This is accomplished by exploding a cartridge, hurling the pilot 50 feet above the ship and clear of the tail-fin for a parachute descent.

The needle-nosed research plane is enameled white, in contrast with the orange-tinted Bell X-1. Engineers feel that white will afford the greatest visibility when the plane is visually tracked through the cloudless skies high above Muroc dry lake. Tracking by radar will not be affected by the ship's color.

Wing span of the X-5 is 32 feet nine inches; it is 33 feet four inches long, and measures 12 feet in height from ground to fin tip. The plane weighs about 10,000 pounds. The spear-like boom, which extends another eight feet from the nose, houses yaw-measuring devices and a pitot tube for registering indicated airspeed.

Of the five Air Force assignments for the construction of experimental aircraft capable of transonic or supersonic speeds, three have been awarded to Bell. The company designed and built the X-1 and is now building the X-2. The X-2 will have sweptback wings, will be rocket powered and parts of it will be made of stainless steel. Bell is also building variations of the X-1. These are the X-1A, X-1B, and X-1D.



Where in the world do you want to go?

Only TWA offers
one-airline service
from 60 U. S. cities to
Europe • Africa • Asia

SEE YOUR TRAVEL AGENT
or call Trans World Airlines

Pilots! Watch for October Issue

- Control Tower Tips: For the sake of yourself and your plane, heed these tips offered by a pilot who writes about the Tower from experience.
- Aero Commander: Here is a pilot's Report on an airplane designed to meet the needs of the businessman pilot or the long cross-country airman.
- Night-Strike: Close-air-support missions flown at night require pilot precision and a trigger finger on guns that blast in inky darkness.

SKYWAYS

AERONAUTICAL UNIVERSITY

FOUNDED BY CURTISS WRIGHT

Be essential to an essential industry

- The aircraft industry urgently needs trained experts. YOUR opportunities for a career in aviation are greater than ever before.

Prepare now for a rewarding and interesting future at Aeronautical University, one of America's oldest recognized aeronautical schools.

Enroll for one of the following courses:

- Aeronautical Engineering
- Aeronautical Eng. Drafting
- Airplane and Engine Mechanics

(Approved by U. S. Govt. C.A.A.)

Classes are scheduled so you may earn-as-you-learn through part-time employment. Placement service. Approved for civilian and G.I. training. Big demand for graduates. Write for free bulletin and "Careers in Aviation."

AERONAUTICAL UNIVERSITY, Dept. 10, 1905 S. Prairie Ave., Chicago 16, Ill.

Muroc: Proving Ground

(Continued from page 16)

Patterson Air Force Base at Dayton, Ohio. Static tests on the airframe itself are also done at Dayton.

High winds present the only weather problem at Edwards. Temperatures range from below freezing in the winter to 115 in the shade in July, but the near-zero humidity makes living conditions surprisingly comfortable. The dry lake is too damp to use approximately five per cent of the time, but there never is a condition when a pilot could not land wheels-up with safety.

The sixth phase of the Air Force flight-test program is an accelerated service test. Frequently, finished airplanes are already rolling off the assembly lines while this final phase is being rushed at Edwards. On high-priority equipment, this service testing is flown concurrently with Phase IV of the program. In service testing, the 18 pilots of the Edwards military flight staff endeavor to crowd as many hours as possible on the new airplane to find out about parts consumption. They find out how long it takes to change a tire or an engine. In addition, they train the first group of tactical pilots to use the new planes. When the nucleus of tactical pilots return to their squadrons, they take with them the know-how of these hard-working experimental test pilots.

Once a new plane is turned over to a tactical unit, one might think that the flight test group would be through with it. Nothing could be more in error. For example, they are still running tests on the F-84; tests that are leading to interesting new utilizations of the aircraft. The North American T-28 is still flying stability and control tests with rockets and bombs—and the second large order for the '28 has already been completed by North American.

There's none of the "glamor boy" atmosphere at Edwards. Each pilot has his own brightly painted crash helmet—usually built by Dr. Lombard—and painted with picturesque designs, but that's about as far as it goes.

"Actually, that helmet painting is very practical," explained Col. Askounis. "We can always tell who is in the airplane, either in the air or on the ground, just by the color of his crash helmet."

"It's plain hard work for these boys to roll out to the flight line at four in the morning,

do precision flying until the desert air gets too rough. Then knock off for lunch, write reports or fly later in the day. The boys usually burn the midnight oil when they're on a project, working with the engineers to plan the flying program for the following day. When we're working on an airplane—and we're *always* working on some ship—the boys fly six days a week. They have a tough time getting away for their annual leaves. A pilot must really love to fly or he won't last long here."

This love of flying seems to be the by-word among the experimental test pilots. "It's a real challenge to a guy's flying ability," explained Captain Joe Wolfe, an ex-National Airlines DC-4 driver. "The engineers prove it on paper, but the experimental test pilot is the guy who has to prove it in the air. This is the last word in flying; we not only know what happens to the airplane but we learn why it all happens. Flying passengers in a DC-4 is precision work, but it's nothing like the hair-splitting we do in these new jobs."

It's hard, hot, dusty work. Each flight may test a dozen different items: take-off time, rate of climb at three or four different airspeeds, engine temperatures, instrument calibration, fuel consumption, fuel-transfer system, and an endless list of details.

"We can't do just what we want to on these test hops," explained Major Charles Yeager in the Operations room of the huge hangar at Edwards. "The average test flight may turn out to be an evaluation of lateral stability at a half-dozen different speeds. Perhaps it's aileron rolls, and by the time you've made 30 aileron rolls on one flight with a full set of notes on each one, you're a little sick and tired of rolling around the sky. It's all precision flying and constant observation of what's going on."

As a precautionary measure, each new airplane is "escorted" on every flight. If there's any tail flutter or smoke, the escort pilot can see it where the test pilot cannot. During a recent first flight in a still-secret plane, Captain Russell M. Roth from the cockpit of his escort plane watched the factory test pilot drop his landing gear for the first landing. All three wheels came down but they didn't look just right. As a double check Captain Roth brought his chase plane in close formation—close enough to see that the "dogs" holding the gear down were not locked. The civilian test pilot then brought his new plane down on the broad dry lake and very gently

touched each wheel—one at a time—to lock the gear. Then he pulled up again and went around for a normal landing. The combination of a sharp escort pilot and a precise contractor's pilot saved a valuable airplane and eliminated months of delay in rebuilding a valuable prototype airplane.

"Saves" of this type are routine at Edwards. The broad expanse of the natural airport is a psychological help as well as a very real aid to the pilots. "We never worry about shutting a jet down at 40,000 feet for an 'air start,'" explained Lt. Col. Askounis. "On the first tests of a new installation, it is more than a possibility that the engine won't re-start, but what's the difference when you have a 12-mile landing field below?"

In case of an actual mechanical malfunction, the lake really pays off. When the brakes and flaps "go out" on a B-45, for instance, it takes four miles to come to a stop after landing, but that's no problem on Rogers Dry Lake adjoining the Edwards flight line. When Major Everest had an engine blow up at 21,000 feet, he came in and landed without trouble. When Captain Arthur Murray had the rudder lock in full deflection on a secret project, he slowed the airplane down and landed on the lake in a turn rather than bailing out—as he would have had to do at a conventional airport. When Major J. K. Ridley had the cockpit of his F-86 fill up with smoke immediately after take-off, he was able to land without trouble on the broad expanse of the dry lake. Mechanics later found a broken oil line under the main cowl. When Major Yeager had a "flame out" on the XF-92 10 feet in the air, he still had enough dry lake in front of him to land straight ahead.

Standard operating procedure on first flights at Edwards is a fast taxi test followed by a hop-skip-and-jump flight not over 10 feet above the surface of the dry lake. Then the airplane is carefully checked by mechanics and engineers before the official "first flight" is made.

This desert station also boasts an all-altitude speed course of seven or 11 miles that is efficient up to 40,000 feet. Paralled radio beams record the plane's time over the station and the pilot can double-check the results with a stop watch on his knee-pad.

Because the calibration flights must be meticulously accurate, pilots attempt to avoid the strong vertical currents of the nearby "Sierra Wave." The current testing program to graph the mountain convection currents of the "Sierra Wave" was started when a B-29 pilot from the nearby Navy station at Inyokern had to throttle back completely at 30,000 feet to maintain a constant altitude. Pilots at Edwards attempt to keep all level-flight tests within the same air mass to avoid errors from rising or sinking currents.

"There are no individual stars on our team," said Lt. Col. Askounis of his 18 pilots. "Major Yeager is probably the best known of our pilots because of his original work in the X-1, but he's just one of the group here. Our pilots average 26 years of age and have logged from 2800 to 5,000 hours in the air. Four of our pilots are also flight-test engineers; that is, rated military pilots who have college degrees in aeronautical engineering."

Each pilot flies every plane on the field. Normally, however, they are assigned to the type of equipment in which they have had the most previous experience: fighter, bomber or transports.

SKYROCKET was carried aloft by B-29. Released over Muroc, it flew at supersonic speed



Hobbies of this group of pilots start with fishing and hunting. That makes Edwards an ideal base because the trout streams of the High Sierras near Bishop are only two or three hours drive from the airport.

"When they get a little fat, I put them on a diet," grinned Lt. Col. Askounis, "but with the amount of work we have to do these days, I don't have to worry much about that."

The oldest test pilot on the field is the Commanding General, Brigadier General Albert Boyd. He's 44, but he flies everything on the field from the little L-13 that convoys the payroll car down the desert road from Mojave to the X-1 and the X-4. He never sticks to any one airplane and keeps his pilot proficiency up in all planes. While Major Yeager is assigned to the X-4 project, a number of other pilots, including General Boyd, have flown the research airplane.

One of the first official duties of General Boyd when he took command of this sprawling desert air base was to raise the speed limit for autos from 15 to 30 mph. He felt that anyone would break the lower speed limit, but the higher speed would be honored.

At one time before General Boyd's arrival, the morale of airmen stationed at Edwards was not the best in the Air Force. Housing was, to say the least, inadequate. Weather-beaten buildings had holes in the roofs and sides so that a layer of sand was always covering beds. Infrequent cloudbursts flooded the skimpy quarters. General Boyd found some surplus lumber—no one will say just where—and it went first to rebuild the airmen's barracks. Then the bachelor officers' quarters were improved. Today, 724 housing units adjoining the base are nearing completion and new arrivals find the California desert near Muroc not such a bad place to live after all.

Since engineering test pilots don't just happen, there's a flight-test school under the direction of Major J. R. Amann. This small school was transferred to Edwards from Wright-Patterson Air Force Base in Dayton, Ohio, where it began in 1943. Students are preferably engineering college graduates with over 1500 hours flying time. The six-months course includes a refresher course in elementary mathematics, physics, aerodynamics and slide rule work. Flight practice is in performance and calibration tests. The students use B-25's and T-28's for the first half of the program and then "graduate" to F-80's and F-84's. One or two civilian contract pilots are included in each program.

What makes a good military test pilot? According to the current thinking at Edwards, the pilot should have at least two years of college, at least 1500 hours of flying time with preferably some jet time and be in good physical condition. Most important, however, is the answer to the question, "Does he really like to fly?" Over and over at Edwards, a reporter keeps uncovering reference to this attitude. Major John P. Stapp, on temporary duty from the Aero Medical Laboratory at Wright-Patterson stressed that "these pilots have to like flying more than anything else in the world. There isn't a pilot who lasts long in this testing business if he's just putting in enough flying time to draw his flight pay." Major Stapp is in charge of the "deceleration sled," a rocket-propelled sled that tests the effect of extreme deceleration on the human body and the effectiveness of seat harnesses.



AIR FORCE B-47, all-jet medium bomber, carried atom bomb in recent tests in the Pacific

The pilots at Edwards are very fussy about their personal flight equipment. Crash helmets must fit correctly, oxygen equipment and "g" suits must operate without a hitch and their parachutes receive the best of treatment.

A pilot doesn't have to be a potential athlete to be a good test pilot. Take Major Jack L. Ridley. His colleagues say that he doesn't weigh more than 110 pounds wringing wet, but he has a master's degree in aeronautical engineering from the California Institute of Technology. With his ever-present rotary slide rule, he figured the exact take-off roll for the rocket-powered X-1. When Major Yeager made the flight, his take-off point on the lake was within inches of the spot forecast by Ridley. Major Ridley is one of the four Edwards pilots with engineering degrees.

"A good engineering test pilot has to be curious, mathematically and mechanically minded," said Major Ridley. "Captain Roth, for instance, diagnoses trouble in turbojet engines merely by the sound. He can tell the engine specialists on the ground whether the trouble is to be found in the compressor, main turbine wheel or the afterburner."

Not all the testing is done in the air. Improved air-scoop guards on the latest F-86's are the direct result of a flight-line accident in which Corporal Charles F. Fultz bent down to tighten the nose-wheel chock of a fighter while a civilian mechanic was running up the engine. Although two or three feet behind the intake mouth, the corporal was suddenly pulled—still crouching—into the air intake and wedged against the screen inside. Extreme suction from the intake's near vacuum pulled apart the pages of a book he had in his pocket. These pages lined the intake screen and contributed to saving his life by shutting off part of the vacuum. Another ground crew man notified the mechanic and the engine was shut down.

As in all projects of this type, there is time for a little comedy relief. One of the pilots—name withheld by request—removed the hub cap from General Boyd's brand new Buick and inserted a stone before replacing the cap. The hullabaloo it set up was only exceeded by the vociferous consternation of the General. On another occasion the same pilot spent all his spare time for a week in the wood-shop, turning out exact scale models of clay pigeons—made of wood. When the General, an excellent skeet shot, came up to shoot against his fellow officers, these wooden "birds" were substituted for the clay pigeons. He hit them, but they didn't break. However, in spite of the horseplay, there is nothing

but respect on the flight line and the base for the General. He is considered a test-pilot's test pilot.

Actually, the only fun that these pilots have in flight is an occasional series of acrobatics at the conclusion of an "escort" flight. The rest of the time it's nothing but precision flying.

The dry lake at Edwards has not always been a test station. It was originally populated as a water stop when the Sante Fe railroad was constructed in 1882. The "town" consisted of two sidings, a water tank, one well, one coal platform, four houses and a pumping plant. Now over 3,000 civilian and military personnel live here.

The town was originally called Yucca—later Rogers and then changed in 1910 to Muroc to honor the Corum brothers (spelled backwards) who homesteaded the area! Prior to World War II, the 12-mile lake was used frequently as a speedway for hot-rod auto races. During the war the south end of the lake was used as a training field for P-38 and B-24 crews. A 650-foot realistic model of a Japanese cruiser of the Mogami class was built and flight crews used it as a practice target.

In 1942 the north end of the lake was selected for a flight-test station for the first jet-propelled planes. Prime considerations were—and still are—broad terrain, remoteness for security requirements, and suitable transportation facilities. The station was renamed Edwards Air Force Base in 1950 in honor of the late Captain Glen W. Edwards who was killed in the crash of an experimental YB-49 "Flying Wing."

When newspaper headlines announce that billions of dollars of the taxpayers' money have been appropriated to purchase an undisclosed number of new tactical aircraft, the broad surface of the dry lake at Edwards has had a lot to do with choosing which aircraft from which manufacturer obtained the contract. Naturally, the military pilots at Edwards are completely impartial. Their flying is non-competitive and the standards are abstract. Their job is merely to fly the airplane and establish lines on a graph to describe its stability and control and to be sure that the performance is up to the requirements specified by the Air Force for that particular type of ship.

It still takes seven years to make a tactical airplane—from original idea to planes in numbers in the air. The main job of the pilots at Edwards is to whittle down that time. With the aid of nature's best airport, they're doing all right.

Flying the Jet Stream

(Continued from page 13)

being attached under the radiator air scoop under a single fairing. An emergency radio range receiver also was available. This set was operated by dry cells and, therefore, remained independent of the ship's electrical system.

The flight instruments were standard with a few exceptions. I had a Lear automatic pilot with separate cut-out switches for each of its functions, enabling me to cut out pitch, roll, yaw, or automatic elevator trim if any one of these functions ceased to operate. The automatic pilot is vacuum driven from the artificial horizon and directional gyro.

I had an electrically driven bank-and-turn indicator to allow instrument flight in case of vacuum-system failure.

The ship had a small and very ordinary aircraft magnetic compass installed just below the top of the cockpit canopy directly in my line of vision, and in a location which proved to be comparatively free of magnetic influence. My compass installation at one time had been one of my most perplexing problems. The original installation was subject to wild fluctuations every time an electrical component was switched on or off. I had particularly wanted a Sperry Gyroscopic compass but, unfortunately, had run out of funds before tangling with the compass problem. If I had this flight to do over again, I would give the compass situation top priority, second only to the engine installation.

However, after a lot of juggling, my compass arrangement finally worked out remarkably well. This very small compass seemed to be almost insensitive to the ship's electrical equipment as compared to some of the more elaborate variety which I had previously tried. I calibrated this little gadget with extreme care and the extra diligence paid dividends. With the aid of my

astro compass installation, I was able to compile a very accurate deviation chart in a two-hour test flight.

In the event of compass failure I had the astro compass to fall back on. This compass can be mounted or dismounted from a removable bar installed in a thwartship position directly in front of the pilot's seat, and I was able to slide the compass mount itself to the right or left across this bar to such an extent that I could conveniently take azimuth readings of the sun through 220° of arc, 110° on each side of the bow.

My navigation equipment, excepting the radio and the two above mentioned compasses, included two Link bubble sextants, H.O. 214 and H.O. 218 tables for Latitudes 50 to 59, and the Air Almanac. Besides my ship's clock on the instrument panel which kept almost perfect time, I carried two wrist watches which had been carefully calibrated. My navigation table was a clipboard on which had been folded a chart of the North Atlantic. Dividers and protractor were tied to the clipboard because, if I dropped them on the floor, I don't think I could have recovered them. I carried an Airways Manual with all the correct airport and airways information; also an airspeed computer.

However, in order to avoid the necessity of referring to the Airways Manual, I inscribed all pertinent information on the chart, particularly the important radio beacon and broadcast station frequencies for the British Isles and France. I also compiled a complete list of these radio stations in the numerical order of their frequency so that I could spin the ADF dial and make a quick identification of any station I might pick up on the direction finder.

I had planned to navigate primarily by radio but, in case of electrical failure, I was prepared to go to work with the sextant. From New York to Gander, Newfoundland, there was no navigational problem. It would merely involve tuning in the automatic direction finder and flying from radio range

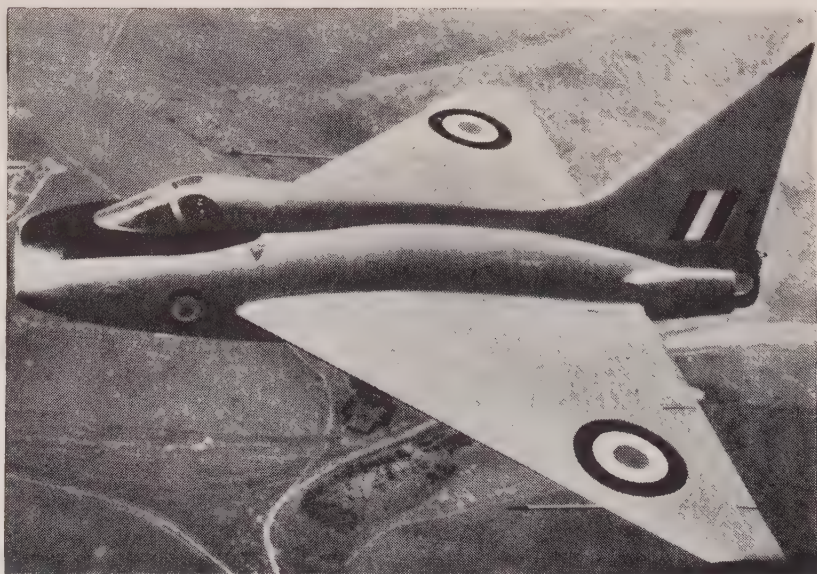
to radio range on the route via Boston, Massachusetts: Yarmouth, Halifax and Sydney, Nova Scotia. From Gander I planned to fly a modified Great Circle to Shannon, Ireland, via weatherships "Charlie" and "Jig," hoping to take bearings on these ships if I had not drifted too far off the desired track. As an additional position check I planned to obtain radar fixes from these two weather stations if within range. Weather station "Charlie" is stationed 745 nautical miles east-northeast of Gander and "Jig" is 570 nautical miles due east of "Charlie." From "Jig" I planned to pick up the Shannon radio range, then the Strumble radio beacon on the western tip of England near St. David's Head, then the Bristol radio range and the Woodley beacon, and finally London radar for the approach to London.

I set up my departure from New York to be 0730 GMT, 0230 New York time, to allow for an informative sun line in the approximate longitude of weather ship "Jig." This would confirm my latitude in the event of radio failure, or in case I had drifted to the north or south of "Jig" out of range of the radio compass. Considering the extreme wind velocities being reported, it wouldn't have been too surprising to find oneself several hundred miles off course, if navigating for several hours strictly by dead reckoning without benefit of radio or sun lines. I had a dread of landing in Bordeaux, France, or Stornaway to the north of Scotland, and then trying to explain to my friends on the airline. Therefore, I took every navigational precaution.

To make this emergency celestial navigation relatively simple, I precomputed my sun lines for every 5° of longitude between Gander and Shannon. For each assumed position, I worked out the computed altitude and azimuth for 10-minute intervals over a three-hour period. This arrangement allowed for a quick interpolation of azimuth and intercept for a rough approximation of a sun line. Because of the nature of my craft, I did not require pin-point accuracy until arriving close to my destination.

As for the actual flight, it worked out very much as I had expected except that the strong winds reported between New York and Gander had veered to the west-northwest from the forecasted west-southwesterly, thus reducing my tailwind component to a very considerable degree. This windshift cost me 29 extra minutes of flying and accounted for most of the difference between the flight plan time of 7 hours and 6 minutes, and my actual flying time: 7 hours and 48 minutes.

Between New York and weather ship "Charlie," I cruised for the most part at 29,000 feet, ascending to 37,000 feet to take a frontal system which lay to the east of "Charlie," soon thereafter dropping to 35,000 feet for the remainder of the distance to Shannon. I was on top of all cloud for the entire distance after the initial climb between New York and Boston and until the descent into London. The upper winds between New York and Shannon were of considerable violence, although not consistent from the desired direction. A real sample of the jet stream was experienced in the vicinity of weather ship "Charlie," with an estimated wind from 250° at 200 knots (230 mph) for a brief period. A radar plot of my ground speed in the vicinity of "Charlie" showed my ship to be tracking along at 520 knots (600 mph) which,



BOULTON PAUL P III is England's newest delta-wing jet. It is currently undergoing flight tests. Powered by a Rolls-Royce Nene turbojet, the Boulton Paul P III is a single-seater designed for high-speed aerodynamic research flying

accurate, would confirm this wind estimate.

Three days later, in very much the same upper-air circulation, a Pan American Airways *Constellation* reported a wind from 270° at 225 knots (280 mph) in the vicinity of ship "Charlie," at 19,000 feet. This particular "Connie" reported an average tailwind component of 138 knots (159 mph) between New Foundland and Ireland, which I believe is the strongest wind component on record for such a distance. My own average tailwind on that particular stretch was a mere 90 knots (103 mph).

My average winds between fixes as I experienced them are estimated to have been approximately as follows:

Boston-Yarmouth

310-100 knots (356 to 115 mph)

Yarmouth-Sydney

290-100 knots (334 to 115 mph)

Sydney-Gander

280-100 knots (322 to 115 mph)

Gander-Charlie

250-80 knots (278 to 92 mph)

Charlie-Jig

250-150 knots (278 to 178 mph)

Jig-Shannon

270-60 knots (310 to 69 mph)

Shannon-London

(descending)

300-10 knots (346 to 11 mph)

As I had hoped, I was able to navigate entirely by radio, using the automatic direction finders as well as the radar fixes as passed along by the weather ships. Of particular importance, of course, was that insignificant little compass. After passing Gander and dead reckoning for 600 miles, I tuned in the direction finder on "Charlie." It pointed at the weather ship directly over the nose.

Statistically, this flight averaged 388 knots, or 446 mph over the non-stop distance of 3,025 nautical miles (3,479 statute miles) in 7 hours and 48 minutes. Flight time from over Gander, New Foundland, to over Shannon, Ireland, was 4 hours and 10 minutes, averaging 417 knots or 480 mph. Arriving over London, I had sufficient fuel remaining for another 1,000 miles of flight at reduced power. If, on this particular day, I had used long-range cruising techniques, I could have cruised non-stop from New York to Moscow and returned to Berlin without landing for any Russian gasoline. Perhaps this aircraft wouldn't do too badly as a reconnaissance type.

The jet transport of the future is going to have an occasional struggle with this so-called jet stream. However, considering our increasingly accurate North Atlantic upper-air forecasts, I would venture to say that most of the time it will be possible to detour around the most violent core of these extreme winds.

Probably the most effective detour will be via Iceland. The excellent all-weather airport at Keflavik may become as important as Shannon, Eire, as a fueling station for westbound jet aircraft. Even now our pressure-pattern flight planning will, on numerous occasions, indicate a shorter flight plan from London to New York via Iceland than on the Great Circle through Shannon. As the jet and turbo-prop transports come into the picture, with flight planning at extreme altitudes becoming a necessity, this far-northern route will solve much of the problem introduced by the violent westerlies of the jet stream.



SKYWAYS' Special Offer!

A chance
to save \$\$!!

~~28~~ 28
^ issues for \$5.00!

SUBSCRIBE to SKYWAYS today . . . save \$2.00* and get 4 months' issues FREE! For a limited time only, a 2-year subscription to SKYWAYS brings you 28 issues of the pilot's magazine that's packed to the covers with plane facts and figures, news and views of the latest military and civil aircraft, supersonics and electronics, up-to-date cues on job opportunities, plus plenty more. Keep pace with the fast-moving world of aviation at \$\$ savings to YOU!

*at regular newsstand price

14 42
~~36~~ ^ issues for \$3 - ~~36~~ ^ issues for \$7

Mail this coupon today. Mail it NOW!

J. Fred Henry Publications, Inc., 444 Mad. Ave., New York 22, N. Y.

Please enter ☐ renew ☐ my subscription to
SKYWAYS for ☐ 1 Year + 2 Months (enclosed find \$3)
☐ 2 Years + 4 Months (enclosed find \$5)
☐ 3 Years + 6 Months (enclosed find \$7)

and start it with the _____ issue.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

If you change your address, notify us. SKYWAYS will follow you wherever you go.
Add \$1.50 per year for postage to other countries, except Canada and Pan Am.
Union.

9-51

Forced Landing Formula

(Continued from page 24)

a habit of pulling them up as soon as you leave the deck on all take-offs), putting your flaps down, cutting your switches, and opening the hood if your plane has a hood. However, if you have almost no time at all, it's best to do just one thing. Cut your switches, and glide down and land. It's far better to land a plane with wheels down, flaps up, hood closed, and out of trim—but land it in a gentle flat glide—than to concentrate on completing a check-off list and end up stalling the thing or spinning it in.

There are, of course, some fields which present a very unhealthy-looking situation up ahead the moment you have reached the point-of-no-return at midfield. I know of several. I go into that type of field just once. If I had to use such an airport for a home field, I think I'd probably either give up flying or move to another place where the airport was safer. I know this will draw a lot of sniffs and chuckles from the bold boys, but it's what I'd do.

Now, suppose you have reached the boundary of the airport with 400 feet altitude, not enough, really, to get back in, but facing a very grim-looking grove of trees, a gully, and a group of houses. This is the worst type of daylight forced-landing situation, and I hope you never have to face it. However, if you do get in it, *you still have to go ahead*. Remember that if you don't stall or spin and hit the deck nose down, you have a good chance of survival no matter where you land. The tops of trees with a lot of bushy, springy branches and foliage make an acceptable substitute for a runway in an emergency. Or, if you have a chance to get the plane down near the ground, it's good to float it in between two big tree trunks, sheer off the wings, and decelerate in that fashion. Or, if you have to land in one big tree, stick the nose in a few feet away from the trunk, so that the prop doesn't hit the trunk with the nose, and hope that the limbs will grab the plane and hold it there. Be careful not to ram the trunk with the nose, as this means a sudden deceleration and will probably hurt you.

If you have a chance, on one of these hair-trigger, little-or-no-choice forced landings, and there's a pond or lake or river with deep water handy, set your plane down into that in a slowed-up three-point attitude. If your safety belt is tight and, better still, if you are wearing shoulder harness, the worst that can happen is that the plane will go over on its back and you'll have to make an underwater escape. Such an escape isn't too tough, however, if you can swim and don't lose your head in excitement. It's just a matter of waiting till all the hell has stopped, popping your safety harness, and crawling out. But beware of swamps and shallow water. If you flip over and are trapped, you could drown.

In all rough-country landings, try to hit as slowly as you can, short of an actual stall. In other words, slow-fly it into the treetops, and do a little praying. *But don't ever stall it.*

Now, suppose you have reached your cruising altitude, say 3,000 or 4,000 feet, and are headed on a cross country. I have made an extensive personal research into the art of making forced landings from middle alti-



MARTIN 404, first of 103 being built for airline service, rolls out the door of final assembly building. Plane seats 40; powered by two P & W R-2800 engines

tude, and it's tougher than you think. In the first place, when the engine quits at 4,000 or 5,000 feet, you have a long time to contemplate the unpleasant fact that here you are without any power, and that if you don't do this thing right the first time you won't have a second chance. You tend to do two things. First, you get frantic trying to settle in your mind which field you will trust your fate to. Second, you tend to approach the field of your final (and perhaps too-belated choice) without any preconceived plan of maneuvering the airplane into position for a safe, moderately slow, accurate final approach. I would like to say here that there is no foolproof rule to use in making all forced landing approaches from altitude. You have to use one on one field, another on another. I know this to be true because, during my experiments, there were several times when I thought I had it licked with one Master Approach System, only to have that system fail miserably on the very next try.

I have found out some useful things, however, and there are some practical, good rules to follow. Let us start with the straight-in approach. You use the straight-in approach only when you have one field to choose from and only enough altitude to get you in. This approach should only be used as a last resort because, if you undershoot, there is no recourse. Remember that you can get the best range out of your plane by leaving the flaps up and gliding at the speed recommended by the manufacturer for maximum distance. In lightplanes, you can't go far wrong with 70 mph for this.

But suppose you have a field that you can reach easily and still have altitude to spare. There are two key "spots" near that field. Either one of them will set you up for a pretty sure safe landing. They are, of course, the spots about 700 to 900 feet above the ground around 800 to 1,000 feet out to the side from the downwind boundary of the emergency field either to right or left, and with the airplane headed downwind. They are the spots that you have been using during all your flying career to chop throttle and make a 180 power-off landing. If you can put the ship in either one of those spots, you

have won half the battle.

Now, how do we get to one or the other of those spots with a high degree of positiveness from, say, 4,000 feet? One way is to spiral down. Glide to the downwind section of the field you intend to land on with as little loss of altitude as possible, put the ship in steep, tight bank, so that you don't ever lose visual track of the field, hold the nose well down, keep the speed around 80 and corkscrew straight down. When you get around 1500 feet above the field, break out of the spiral, head upwind, and make either a left or a righthand turn toward the "spot" we just mentioned. If you find you broke out too high, let the ship go a little wider on the downwind leg, *but not too wide*, and get in approximately the right spot. If you broke out too low, hold your fairly steep spiral turn, stay in close, and land.

If you must err, it's best to be on the high side. When you hit the "spot," start your 180 to a landing. If, in the base leg of the 180, you find you are high, let the plane go on past the intended runwayline and S it back again, thus losing altitude. Come in a little higher than normal. When you are sure the field is yours, make a nose-high slip, and come on down. Hold the plane off as long as you can if you have the space. If, however, you see a wall of trees rushing at you, groundloop it. Make your groundloop as graceful and non-violent as you can. But remember, it's better to shed the wings than to hurt yourself.

There are two dangers to watch out for.

The first one is that you misjudge your altitude, fall too far below the downwind boundary of the field, and find you are going to fall short. There's only one recourse here. Grin—and crack it up. Don't ever try to stretch your glide! The second danger is that you will come in too high to make the field at all, but also too low to go around again, and then you will be in the position of a man whose engine failed on take-off—land straight ahead and hope. Still a third danger, for the man who flies an airplane which won't slip (Ercoupe, and, to some extent, the Mooney) is that he will get in trouble by using S turns to lose altitude. An S turn is a good hold-off-altitude-loser unless



HARMON TROPHY winner is Col. Dave Shilling, now on temporary duty as C. O. of 31st Fighter Escort Wing in England. He won trophy for jet-flight across Atlantic

u get too low and too close to the runway while you are traveling at right angles to the runway. In other words, you get right down near the ground and find you have to wrap the plane up in a vertical bank to get it headed into the wind. It is easy, I find, to run short of airspeed just at this point . . . a highly dangerous thing. The temptation to bank the plane and keep altitude by back pressure on the stick is almost irresistible. Don't run out S-ing, quite literally, "into the wind." The S is best used back up there in the 400-foot part of your final approach. If you have a plane that will not slip, the only other way you can lose altitude is to slow-fly it. In order to slow-fly a plane safely, you should have a number of hours of practice just with slow flight. (Go up to altitude for this, and really spend some time). On an actual landing, always keep at least 10 mph above the stall point, and let her settle. Then when you have the field under your wheels, move the stick forward and dive at it, flare out smoothly at the last moment. If you are flying slowly enough, this final dive will only give you back 10 mph, and that isn't so bad if you are flying at 60 in slow flight. You can flare out at 70 and float it if you have any field at all. If you have a strike-gear ship, always land wheels-up in an unknown field. The wheels can flip up and really hurt you if they drop into a hole or ditch. *Never try to protect the plane in a forced landing.* You can always get a new plane. It isn't so easy to get a new head. The new flyer should be warned about slow flight, however. It is a dangerous thing unless you know you can handle it. The danger, of course, is that you may stall the plane only 100 or 200 feet up. Remember that we just said about low-altitude stalls. They usually go in pairs, with a slow darkened procession your next, and last method of locomotion.

But, to get back to the approaches from high altitude. There are other ways to get to the "spot" besides the tight vertical spiral. It may not appeal to some pilots because they may tend to lose their orientation, or get excited by doing this steep spiral on top of being scared stiff because the engine is bad. These pilots would rather come down

in some more gradual way, and I'm not criticizing them. The gradual way to hit the "spot" is just as good, for my money.

Let's take a few examples.

Suppose you are flying at 4,000 feet into the wind, and the field you want to set down in is half-mile astern and to your right. How would the gradual approach work here? In making a gradual let-down I would not get the plane directly over the field if you are flying a low-wing ship because the wings hide the whole field. This is a strain on the nerves, even if you know the field is there. Your nerves are working hard enough as it is. I would turn back toward the field, get into a 70-mph glide, and begin to figure. If the wind is high, you want to stick in close to the field, or actually hold right over the downwind boundary of it, at all times. You should read higher speeds on your indicator. If you are dealing with a 40-mph wind, you can hold 100 to 110 on the dial and be about right. In the high wind your biggest danger is falling short. Bring the plane in high. Don't be afraid to dive it at the end to get it down. When you flare, the wind will kill your speed pretty fast. But this again is a matter for practice. You ought to try this sort of thing at least 50 times under different wind conditions if you really want skill.

If the wind is low or if there is no wind at all, keep farther away from the field on all your maneuvers. Your biggest danger in no-wind conditions is undershooting and floating. You'll seem to keep flying forever!

But to get back to the "gradual approach." Don't make any of these approaches with your altimeter. You may read 1500 on it and be over a 1,000-foot hill, so that you actually have only 500 feet. There is no time during a forced landing, to haul out a sectional map and start reading the contour markings. So do all your practice by estimating height with your eyes. You won't be able to use the altimeter with safety in an emergency—don't get to relying on it.

So, as you glide back from 4,000 toward the field of your choice, you see that you are losing altitude pretty fast. You were actually farther from it than you thought. You begin to see, as you near the field, that you can hit the "spot" by gliding toward it

directly, either with a little slipping, or S-ing, or even just a plain glide. In this case you would hit the spot on the downwind leg and make a lefthand 180 to a landing. If you hit the spot too high, then belly out your cross leg, and maybe S a little before committing yourself to your final.

But suppose, as you glide back toward the field from 4,000, you see that you will be too high to hit the "spot" we described. Then aim for the other "spot"—the one across the field. Just cross over the field, turn right, and set yourself up in the "spot" for a righthand approach, using the same maneuvers on the crosswind leg as recommended for the lefthand approach. If you see that even crossing the field will still put you high, don't head directly across, but turn left before you cross the field and belly it out in a wide curve as you work around and down to the right-turn "spot."

The two methods just described will work for any landing made from in front of a field. If you want to make a landing from astern of the field, there are several ways to do it.

You can come up into the wind on either side of the field, just so the main intended runway is visible to you, cross over, and glide around in a 360 to a landing, passing through the "spot" on your way. (You will note I do not recommend coming in directly over the field, but rather slightly to the right or left, so you can see it at all times.)

If you feel you do not have enough altitude for a 360° approach, then come in well to the right or to the left of the field and hit another "spot." For the sake of clarity, I will call this a "position." It is roughly 1,000 feet high, about 1,000 feet to the right or left of the field, and 700 feet astern of the field. In this "position" you are headed into the wind. It is different from the "spot."

You can glide to the "position" either to the right or left of the field. From the "position," turn onto a crosswind leg and hold it off away from the field until you see that by turning in toward the field you can make a normal landing. In other words, just glide to one or the other side of the downwind end of the field and kill time and altitude between that "position" and some point on a bellying cross-wind leg until you are sure you have the field nailed down. Then commit to a final. The biggest danger on this "position" type of approach is getting in too close to the field. If you get in too close, you may have to wrap it up too tight as you turn into the final, and if you are low and slow, this can be dangerous.

If you have flaps, wait until you get either to a "spot" or to a "position" before you pop them. They should not be used during the glide as they reduce your glide range. They also are good to slow you up. You will find that you tend to glide around 80 or 90 if you aren't careful. There's something comforting about airspeed when your engine is out. So, at the end, those flaps will come in handy to kill off that "comfort speed."

All this may sound complicated to you, but if you go up and practice it, and also take a model airplane in your hands and make practice forced landing over a square of concrete pavement or a table to get the methods fixed in your mind, you'll be surprised how simple and positive it all begins to work out. If you actually take the trouble to do these things, you'll get very accomplished at making a forced landing, and someday it may save a life—your own. ✈✈

Fortune from the Sky

(Continued from page 19)

fight episode, Fairchild acquired incipient tuberculosis from spending too much time in his workshop and darkroom, and had to leave Harvard and go to Arizona. He took five cameras with him and continued his experiments. World War I was in progress; aerial photography was then in its crude beginnings, and Fairchild saw that there were no cameras really suitable for this work. The focal-plane shutter, mounted next to the film, introduced distortion. The ideal solution was a between-the-lens shutter, like those used in small cameras, which would open the much bigger eye of the flying camera, and do it fast.

Because his father manufactured office computing machines, Fairchild was familiar with small, complicated mechanisms, and soon he drew a simple sketch of what was to become the first efficient shutter for a flying camera. He tried to enlist in the Signal Corps to put his ideas in practice, but failed to pass the physical test.

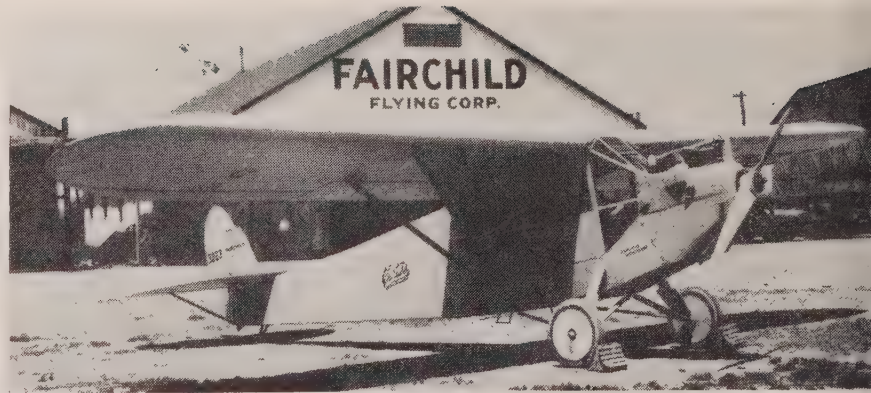
Back home in Oneonta, he showed the sketch to his father, who put up the necessary money. He built his shutter, took it to Washington and showed it to Army top brass. Apathy was almost unanimous.

Then the war ended and service budgets were cut to the bone. Fairchild saw that he would have to build a camera around his shutter to convince the skeptics. Nine months and several thousand dollars later, he returned to Washington with his revolutionary automatic aerial camera. This time he broke the ice. The Signal Corps asked him to build 20 cameras, but before the bargaining was over the purchasing agent, Captain A. E. Nesbitt, had beaten him down to a price lower than the estimated construction cost. Told about the deal, the senior Fairchild grinned broadly. "Sherman," he said, "when you meet a man like that, don't fight him—hire him." Fairchild took his father's advice, and Nesbitt is still working for him.

With the zeal of a prophet, Fairchild talked aerial photography to everyone, but he was ahead of his time and soon saw that he would have to do the job himself. Faced with complex technical problems, he enrolled in the Columbia School of Engineering, and for more than two years spent 15 hours a day between office and classroom.

The first aerial photograph he sold was a picture of a New Jersey resort hotel, for which the manager paid him \$25. In 1922 the city of Newark, seeking to lure new industries, hired him to make an aerial survey showing port facilities and factory sites. Fairchild's glass-eyed spy found many buildings that had somehow escaped taxation. New York asked for a similar survey, and Boston, Kansas City and other municipalities followed suit. East Haven, wanting to reassess its real estate to prepare for a bond issue, found that a ground survey would take five years and cost \$80,000. Fairchild did the job in 60 days and charged \$7,000. By 1928 the business had expanded to nearly half a million annually.

But Fairchild had found no plane that was ideal for picture-making, and manufacturers were not interested in what he wanted. He had built a camera to house his shutter; now he decided to build a plane around his camera. He learned to fly, and hired a pro-



FAIRCHILD factory in 1927 was this tiny building. Plane is FC-2C with Curtiss engine.

fessor of the School of Aeronautical Engineering of New York University to give him aerodynamics courses privately.

Up to that time pilots thought they couldn't fly without feeling the wind on their faces, so even in the few cabin jobs that had been built the pilot sat out in the cold. Taking air photos calls for close collaboration between pilot and cameraman, and camera and film as well as crew must be kept warm for good results. So Fairchild built an all-enclosed plane, with such added features as folding wings for easier storage, automatic trim adjustment to make the plane more stable for picture-taking, and hydraulic landing gear.

The plane was tested on a raw March day at Roosevelt Field before an audience of skeptical old-line airmen. Fairchild and his pilot, Dick De Pew, wore straw hats to dramatize the plane's comfort, and De Pew showed off the plane's stability by reading a book while in flight. The plane created such a sensation throughout the aviation world that Fairchild found himself in the airplane business. The Curtiss company ordered six planes, the Government ordered more, Lindbergh used one to tour the country after his famous flight, and soon the new Fairchild crafts were flying air mail in the United States, Canada, Chile, Mexico, Central America and Peru.

The planes also did the job they were built for, and since then new uses for Fairchild's flying camera have been discovered every year. It has snapped several million square miles of the earth's surface, and has become an indispensable tool in prospecting, lumbering, planning dams, power lines and highways, exploring, mapmaking and military reconnaissance. One of Fairchild's early pictures of a Canadian factory revealed lines across an adjacent field which turned out to be tire-tracks left by thieves; a watch was set and they were caught red-handed.

The camera had reduced to a fraction the previous long months of ground work by gangs of "timber cruisers" who estimate the yield of forests. After the Dust Bowl disaster of the '30's, Fairchild cameras mapped the 68,000-square-mile area in one year, showing Government experts where dams should be located, tree-belts planted, etc.

Last spring the first shipload of rich iron from the new Sierra Bolivar mines in Venezuela arrived in Baltimore—a fact of great significance to our industry and defense. Fairchild cameras had spotted the slides of dark material which geologists identified as iron; surface prospectors might have spent 10 years finding it. Domes which indicate the presence of oil wells are spotted by the fly-

ing photographers, and clues leading to the discovery of lead and copper deposits have been obtained from photographs showing the lay of the land and the color of the vegetation.

In Peru a few years ago one of the great glacial lakes in the high Andes broke through its natural dike and swept down the valley cutting through the city of Juaraz and killing 7,000 persons. The Fairchild Aerial Survey Company was hired to photograph all such lakes which might cause floods. One lake looked suspicious, and a telegrapher was stationed on a mountain above it. When the dam broke, people in the valley were warned in time.

Starting with a single-lens camera, Fairchild went on to build aerial cameras bringing with three, five and even nine lenses capable of mapping as much as 500 square miles of terrain with one multiple shot. Hundreds of photographs, pasted together in mosaics, make it possible to chart vast areas in a fraction of the time once needed. When plane speeds increased so that clear shots could not be taken with stationary film, Fairchild cameras were redesigned so that the film moves to match the fast unrolling of the panorama below.

Aerial photography has revised the maps of all the continents and the seven seas. Thousands of small lakes have been discovered, and innumerable errors in coastlines, river courses and mountain ranges have been corrected, for which flyers and mariners are grateful.

No invasion of enemy territory was attempted in World War II without complete photographic coverage, pin-pointing every objective and military installation. About 90 per cent of the cameras used by the Allies in this work were either of Fairchild manufacture or Fairchild design.

In reaching into foreign fields the need arose to develop specially trained crews and radio facilities. These facilities proved essential for the commercial operation of a secret wartime submarine detecting development—the magnetometer. This device which is dragged on a cable behind the airplane records a change in the magnetic strength of the earth. These changes, when plotted on a map, can be used as another tool to locate oil and minerals.

Since his first brain-child grew to maturity Fairchild has launched new projects so fast that his engineers and executives have a sprint to keep up with him. He subscribes hundreds of scientific and technical publications, skims them with lightning speed, and out pages containing fertile ideas a

outes them to key men in the far-flung Fairchild enterprises. He often works until midnight, and has never been known to take a vacation. In the hospital after a serious operation last spring he demanded stacks of reports and data every day, and kept a secretary busy with a tidal wave of out-going memos. When he gets an idea for a new product, he often forms a separate company and backs it with his own funds rather than burden the stockholders of his established companies with a personal brain-storm which may not pay off.

There are now five Fairchild corporations employing about 9,000 people. Orders now on the books and being negotiated total more than \$300,000,000. Soon after the last war, the Fairchild Engine and Airplane Corporation set to work under government contract to do research on an atomic plane project. Other locked-door developments are the corporation's guided-missile division at Wyandanch, N. Y., and the jet engine development at Farmingdale, N. Y.

Last March, when thousands of American paratroopers dropped behind enemy lines in Korea and cut the escape route of a Red Army, they bailed out of Fairchild *Flying Boxcars*, the most versatile cargo planes ever devised. These twin-boomed monsters carry 20,000 pounds and have double doors in their tails through which 2½-ton trucks can be driven. They need no landing fields to unload, for they can drop their cargo by parachute. Their value was dramatically shown last fall when they dropped a 16-ton bridge in sections, enabling our retreating Marines to span a river and save their equipment.

Fairchild's boundless zest for new and better techniques has touched off a number of peacetime devices which may work big changes in publishing, motion pictures and sound recording. One is an inexpensive electro-mechanical process to replace photoengraving for newspaper and magazine illustrations. A photograph, scotch-taped onto a revolving cylinder, is scanned by a light beam; the beam controls the depth of a tapered hole which a red-hot needle burns into a sheet of plastic, thus giving areas which print light or dark tones. It is already in use by 600 small newspapers and publishing plants which can't afford conventional photoengraving equipment. The New York Metropolitan Museum of Art used the machine recently to reproduce paintings in an exhibition catalogue. Says Fairchild, "Some day soon we'll make color as cheap as black-and-white."

For years Fairchild has been working on a high-fidelity process of tape recording. Mainly with his own money he has set up the Fairchild Recording Equipment Corporation at Whitestone, N.Y., a small egg which may hatch another big industry. With further development, images as well as sound could be recorded, and Fairchild foresees a new type of motion-picture camera which will capture both pictures and sound on a moving roll of magnetic tape.

From his office in Rockefeller Plaza he looks out over the "Fairchild empire" formed to implement his hunches—a structure composed of so many corporations and divisions that it would take half an hour to list them. Yet filed away in his modern office are still more ideas with futures unguessable. "Never in the world's history," he says, "have there been more opportunities to do things to make life easier and better."

CAOA Report

(Continued from page 37)

diate Common System plan the thinking of all available sources and to provide the coordinated system with the support of all elements of aviation, thus making it acceptable to all users of the airspace.

"The Group, headed by Commander Wuerker of the Coast Guard (hence SWG-5 was often referred to as "Wuerker's workers"), went into the field to determine, discuss and evaluate the needs of these users. Field trips were made to large terminal airports, airline operations centers, CAA traffic control centers, the All-Weather Flying Division, the CAA Technical Development & Evaluation Center, Indianapolis, etc. These conferences in the field included representatives of the airlines, Air Line Pilots Association, the CAO, flying farmers, Airport Operators Council, and other such flying interests as the fixed-base operators, private pilots, etc.

"After 10 months of hard work the Operational Policy Group wrapped up its proposed system and program into a report entitled "Air Traffic Control and the National Security." I believe all of you company pilots should get a copy of this and study it.

"This so-called "SWIG-5 Report" contains a detailed and comprehensive description of a practical and up-to-date air traffic control system for the U.S., a system which is flexible and capable of expansion to at least double our present capacity, and which will permit operations under virtually all-weather conditions. It is important to point out that this proposed system is built on established and existing civil and military programs, and further that the over-all plan lends itself to immediate implementation."

CAA and Production—The final address was by G. Ray Gaillard, Chief of the Office of Aviation Defense Requirements, CAA, who spoke on "The CAA's Role in Production of Non-Carrier Aircraft, Parts and Equipment during the Emergency."

He said that the OADR had been working with the Munitions Board and had been able to get the scheduled air carriers and large irregular air carriers into a program with practically the same priority assistance as enjoyed by the military.

"In the non-carrier program, we are attempting to establish the essential requirements for aircraft needed by defense-supporting civil activities, such as executive, agricultural and industrial flying. . . .

"You may be wondering how to get maintenance spare parts. At the present time NPA Regulation 4 allows those companies or persons who use their aircraft in business to use DO-97 on their orders for maintenance spare parts. Under the Controlled Materials Plan (CMP) we believe you will have to stamp your order "DO-MRO" instead of DO-97 (MRO stands for Maintenance, Repairs, Operations).

"VHF airborne radio equipment stands in a little different category. We expect a decision any day now from DPA allowing the radio manufacturers to produce several thousands of sets during the three quarters ending March 31, 1952 for non-carrier aircraft. This is to permit them to get the equipment they need to properly use the Common System about which you have been hearing this afternoon."

Taylorcraft

THE WORLD'S FINEST LIGHT PLANE!



• Taylorcraft "Sportsman"

... half a million miles
and still going—



HARRY T. WILSON, Mgr.,
Mid-South Airways,
Memphis: "Our oldest
Taylorcraft has flown
5635 hours—never gave a
bit of trouble and is still
going strong."

All around visibility, two place side-by-side cabin with a 15 cu. ft. cargo space, 85 H.P. engine with starter and generator—these and many other features make the new TAYLORCRAFT "Sportsman" the best buy in the LOWEST PRICED field.

Write for folder—see your local airport today!

2 PLACE • 4 PLACE • TANDEM
ESTABLISHED OPERATORS: Write for details
on Dealer Franchise

Taylorcraft, INC.
CONWAY-PITTSBURGH AIRPORT
CONWAY, PENNSYLVANIA

NEED EXTRA CASH?

Here's How to Get It

EARN cash commissions easily,
selling subscriptions to SKY-
WAYS and OTHER POPULAR
PUBLICATIONS in your spare
time. For details and supplies clip
and mail the coupon today.

SKYWAYS

Box 394 Independence Square
Philadelphia 5, Pa.

Please mail me your spare-time
commission offer.

Name.....

Street.....

City.....Zone No.....

State.....

Air Control Group

(Continued from page 29)

plotting board that marks the CAP's course.

In the Tactical Air Control Center, a controller calls out the squadron's report. Instantly, a red X and the information on the enemy formation and the yellow O of the CAP are placed on the TACC's plotting board map. There are other red X's on the map—the enemy is trying to break in from other directions. Other intercept squadrons have picked up and reported these bogies.

At the TACC you see the big air defense picture. Here information from the intercept squadrons is plotted and analyzed by the center's air defense officers. Through the TACC's supervision, the squadrons—each assigned a section of the TACC's area—actually direct the combat air patrols' interception of enemy aircraft.

Back at the squadron intercept center the place is alive with activity. Operators, bent over radar scopes, are calling out information on the enemy raid. While one plotter gives the speed, direction and course of the enemy, another supplies the same dope on the CAP's progress. Plotters are busy marking these positions on the plotting board—red X's for the enemy and yellow O's for the CAP. The plotters stand behind the transparent plastic plotting board and write backward. Now and then during the excitement, a plotter writes forward. His mistake is instantly caught by a "filterer" in front of the board. The filterer checks the board for mistakes and assures the plotter that all information reported is on the board and that it is up to date.

Air control officers, watching the scopes, direct the interception by radio. They inform the CAP of the enemy's movements and supply new courses for the CAP when the enemy planes change direction. Several minutes have passed since the white specks first appeared on the radar scope. The radar operators have kept a close watch on their radar scopes ever since. The tiny, ghost-like pinpoints of light have wriggled around the face of the scopes. The plotters report the bogies' movements on the scopes and spot the CAP's. A series of red X's and yellow O's on the board show the progress of the interception. When the X's change course, the O's also change their line of direction. Slowly, the O's draw closer to the X's. When they converge, a loud triumphant yell brings an end to the vigil.

"Tally-Ho!" calls a plotter.

The CAP has contacted the enemy planes. A few minutes later the flight leader calls in the result of the interception, "Splash seven enemy fighters."

The problem is over. The CAP has knocked down the enemy—by remote control. But before this interception had been completed, another had begun. A new enemy is trying to crash the *electronic wall*. In a matter of minutes, a new set of red X's will splash with yellow O's on the TACC's plotting board.

The up-keep of this electronic fence is terrific. Hundreds of highly skilled technicians and costly electronics and radio gear are needed for this tremendous task. But the best electronic barrier is worthless without trained pilots to make the interceptions and skilled air control officers to direct them. Training these men and other key personnel

is one of the primary missions of the air control group.

Along with the pilot and air control officer instruction, the group puts plotters, net controllers, radar and radio technicians through practical training during actual intercept problems.

"This is the best training we could possibly give them," explained Lieutenant Colonel Hamilton Lawrence, MACG-1's operation officer.

Like other Marine units, the Korean conflict brought to Marine Air Control Group-1, countless personnel problems. Many of the group's skilled electronics technicians were either ordered overseas to air control units or assigned to service schools as instructors.

The influx of Reserves with good backgrounds in electronics has helped alleviate some of this personnel problem. Many had received radar and electronics training during War II. Others came directly from Reserve Intercept Squadrons. Many of the new men were inexperienced. In some cases these new men were put to work along with skilled technicians.

"The only real personnel problem remaining," commented Col. Lawrence, "is the natural reluctance of an airplane driver to sit in a tent and be an air controller."

The qualifications that make a man a good pilot will make him an expert in the control tent. He must be quick, sharp and aggressive. He has to think fast and make snap decisions. A flighty person has no place in air control work. He must keep calm, even though hell is breaking around him. The controllers' reward: long hours at an apparently thankless task. But without him and the guys who keep his gear functioning—there would be no *electronic wall*.

A staff of instructors to train the air controllers was quickly organized. Some of the teachers came from highly unusual occupations. One exceedingly capable instructor, Captain William H. Hewett, sold his seat on the New York Stock Exchange to come on active duty.

Veteran Marine aviator, Colonel Charles Schlapkohl, USMC, commands Marine Air Control Group-1. His organization provides the personnel and facilities for the direction

and coordination of the 2nd Marine Air Wing in air defense and air support of the Fleet Marine Forces in amphibious operations. The group may also be assigned air defense work in connection with other forces.

The fabulous electronic defense wall of an air control group has taken a back seat in the public's mind to the more publicized close-air-support work. Where secrecy has shrouded air defense, close air support has been placed in the open. Today the infantrymen are taught that the fighter plane is an infantry weapon. It becomes his heavy artillery when other weapons fail. If the foot soldier runs into trouble too big to handle alone, he calls for the airplane. The air control groups get those airplanes there.

Air support starts when the ground team of infantry-tank-and-artillery meets opposition too big for their weapons. They call for support. If the battalion's forward air control officer thinks that the target can best be handled by air, he requests an air strike. The Forward Air Controller (FAC) is a Marine aviator assigned to ground units of battalion or regimental strength. He serves as the battalion or regimental commander's air liaison officer advising him when an air strike can best be utilized and the type of armament that will be most effective against the target.

Strike planes are called in to provide the close air support. Accompanying these planes in most cases in an air coordinator, generally a senior Marine aviator, who directs the strike from the air, and when ground troops are unable, marks targets with smoke rockets.

This is the pay-off level of close air support. If the rockets, bombs or bullets land short, they will fall among friendly troops. If they are overshot, they will be wasted and other planes will have to be called in. The FAC is generally in visual contact with the target. If the air coordinator's smoke rocket land on the target, the FAC gives the flight leader the OK for the strike. If they are misses, he has the air coordinator remark until he is on target.

The Marine concept of close air support has more than proved itself in Korea. Marine aircraft have not only supported their own ground forces, but have been utilized by other United Nations troops as well. Flying every plane that bombed a target in support of troops in Korea, there were two pilots—one in the air and the FAC on the ground.

Getting aviators interested in becoming forward air controllers is a difficult task. Pilots want to fly, not *direct* fighter planes. Even though veteran pilots make the best FAC's, an aviator assigned to FAC duty feels like a policeman who has been farmed out to the sticks. Although the FAC's contacts are with ground troops, when two or more of them get together, their talk is strictly up in the air.

Like other Marine aviation units, Col. Schlapkohl's air control group is ready for instant overseas assignment. As part of the Fleet Marine Force, everything they have is designed for field work. No permanent structure hampers their movements. Today, at Cherry Point, the "enemy" is a Marine fighter plane, swapping places with the CAP for training—tomorrow it may be the real thing in some distant land. But because of this training and experience, which the personnel of Marine Air Control Group-1 are getting in North Carolina, they are ready for combat in places like Korea.



MERCY RECORD—Marine Lt. George A. Eaton recently evacuated 34 critically wounded Marines from front lines in Korea to aid stations, via 'copter

Airways Down-Under

(Continued from page 27)

Western Queensland. A little later "Battling Parer," "Skip" Moody, Jerry Pentland, Bert Heath, all ex-Australian Flying Corps pilots, were among the aviation pioneers who opened up the New Guinea gold fields.

The rise of Qantas and Hudson Fysh, now a world figure in commercial aviation, is the greatest success story among them. Wilmot Hudson Fysh became an observer, flew 600 hours and won the DFC. Later he became a pilot but had only a few hours of combat flying when the war ended. In his observer day Hudson Fysh often flew with Lieutenant P. J. McGinniss, and among No. 1 Squadron's ground staff was an engineer named W. A. Baird. These three founded Qantas.

Before the war Hudson Fysh had been a schoolteacher. His first postwar job was undertaken with McGinniss. The Federal Government commissioned the two young airmen to survey the Brisbane to Darwin land route to prepare landing grounds for the England-Australia flyers. The Australian Government had offered £10,000 to the first Australian airman to fly from England to Australia in a British aircraft within 30 days. This was the prize won by Ross and Keith Smith. Fysh prepared the first landing ground at Darwin in time for the winning airman to touch down there. It cost \$700. Darwin is now Australia's "front door" for Qantas airliners and flying boats. The main runway is 10,000 feet long and there are two 5,000-foot runways. Hudson Fysh remembers it as a roughly cleared patch in the bush.

McGinniss prepared landing grounds at Charleville and Cloncurry. This gave him the idea of an out-back "hurry-up" airline to provide amenities in these remote regions. Two Queensland pastoralists, Fergus (now Sir Fergus) McMaster and Ainslie N. Templeton, put up the money and in 1920 the Queensland and Northern Territory Aerial Service Ltd. (Qantas) began barnstorming and charter flying through Western Queensland. Joy rides cost £2/10 a head; £5, if the pilot looped the loop. The original Qantas fleet consisted of two wartime converted Bristol fighters which cruised at 65 mph.

In November, 1922, Qantas began operating a Government-subsidized airmail route between Charleville, Longreach and Cloncurry. This was Australia's second regular air service. Gradually operations expanded until in 1934, the company secured a Government contract for the Brisbane-Darwin-Singapore service, using DH-86's and, later, short "C" class flying boats. The company was then reorganized as Qantas Empire Airways Ltd.

Two giant organizations—the Government-owned Trans-Australia Airlines, and Australian National Airways—dominate Australia's internal services today. Smaller communities fill in the gaps. For instance, W. A. Airline services inland Northwest Australia, and MacRobertson-Miller Aviation Company flies along the northwest coast and operates a flying doctor service. Ansett Airways resolutely competes with the giants on some of the inter-capital routes. Butler Air Transport is the biggest intra-state operator, serving most of the smaller towns in New South Wales. Connellan Airways, based on Alice Springs, serves almost all the cattle stations and buffa-



SPEED BOY—Test Pilot Bill Bridgeman flew Navy *Skyrocket* at implied speed of 1,000 mph over Muroc at 12-mile altitude (see photo, page 44)

lo-hunters' camps and missions in the Northern Territory. East-West Airline conducts a New South Wales country service while Queensland Airlines does the same for parts of Queensland. Guinea Airways, originally formed to operate in New Guinea, now operates in South Australia and Broken Hill, New South Wales.

Connellan Airways is probably Australia's most romantic airline. The company uses two DH Rapides, two DH Dragonflies, a Hawk Moth, a Tiger Moth and a Beechcraft, and covers a regular 8,000-miles circuit in Australia's wildest country. Eddie Connellan who runs the line and flies as chief pilot is not yet 40 years old. He is the last of the pioneer operators. His planes provide a flying bus service and act as important links in the outback country. His pilots deliver messages for housewives, buy stock-whips for cattlemen, carry bottles of medicine, boxes of groceries and toys for the kids. On one route he makes 36 landings in 2700 miles. Passengers don't bother about tickets, they just climb aboard the plane. If they are known (and everybody knows everybody else in the Northern Territory) the trip is booked to a cattle station or some other account. If they are strangers or on their own, the money is collected at some stage of the journey, like a bus fare.

Air veterans of World War I founded Australia's airline industry and been between-the-war's enthusiasts helped build it up. Air veterans of World War II, however, have found little demand for "short-hop" services like Eddie Connellan's because big companies now dominate Australia's air-transport field. Ex-service pilots, navigators, radiomen and mechanics who wished to continue their war-begun air careers have been absorbed mostly into existing organizations. The days of barnstorming and pioneering are over. The future, it appears, must lie with the big companies. The Australian Government is itself through Trans-Australia Airlines, Qantas Empire Airways, British Commonwealth Pacific and Tasman Empire Airways, the biggest single operator.

TAA (Trans-Australia Airlines) began operations in September, 1946, with a Sydney-Melbourne service. Within two years it had

the greatest route mileage in the world and last year it carried its millionth passenger. TAA is run by the Australian National Airlines Commission set up in 1945 under an Act of Parliament which provided for the establishment of a Federally-owned airline as a major public utility and as an integral part of national defense preparedness. TAA is not a Government Department and its staff is not comprised of servants. Head of the governing commission is Arthur C. Coles. Mr. Lester Brain, former operations manager for Qantas, is General Manager. Last year TAA added five *Convairs* to its air fleet. To the middle of 1949 no TAA aircraft had figured in a fatal crash and no TAA passenger had ever suffered any injury.

The other Australian domestic giant is Australian National Airways. Kingsford Smith and Charles Ulm first used this name for an unsuccessful airline venture. The present company was founded in 1936 when Holyman's Aerial Services Ltd. and Adelaide Airways Pty., Ltd. merged. It imported the first DC-2's into Australia and gradually built up an Australia-wide service. Up to last year ANA had maintained its reputation as Australia's biggest operator by carrying more than half the entire number of air passengers inside Australia.

ANA has recently announced investments in two overseas companies, a third interest in Cathay-Pacific of Hong Kong, which operates throughout East Asia, and a 49 per cent interest in Air Ceylon, a new Ceylon overseas operating company. So far, however, Australian Federal Government policy has been to exclude private operators from Australian overseas air services.

The further development of Australia's airways is hampered by dollar and petrol shortages. The pattern, however, is already laid down. There is unlikely to be much scope for the operator. Ex-war birds of World War II who want to combine private enterprise with flying adventure aren't likely to repeat Eddie Connellan's success story. All Australian airlines have enviable records in all three basic requirements—safety, speed and efficiency. But the men who fly the giant airliners of today and some who ride in them, haven't forgotten that group of barnstormers whose courage and enterprise founded a giant modern industry in Australia. In the beginning, often with little more than their faith in destiny and the help of a few twists of wire, they kept their planes flying so that new airways could become national and international highways.



Photo Credits

Page 10, 11—Green & Cross; 12, 13—Acme, Blair, Lear; 14, 15, 16—Downie, Lockheed, USAF; 17—Decker; 18, 19—Fairchild; 20, 21—USAF; 22, 23, 24—Luscombe, Downie; 25—Bell; 26, 27—Australian Dept. of Info.; 28, 29—USMC; 32, 33—Cessna, Beech, Ryan; 38, 39—CAOA; 40—Grand Central; 42—Green; 44—Douglas; 45—AP; 46—Acme; 48—Martin; 49—Harmon; 50—Fairchild; 52—Acme; 53—Acme; 57—CAA; 59—CAA.

★ CLASSIFIED ADVERTISING ★

SKYWAYS' CLASSIFIED ADVERTISING RATES ARE 15¢ PER WORD—FIRST 15 WORDS (MINIMUM SIZE) \$2.00

AIRCRAFT WANTED

POWERS & GEORGE, Aircraft Brokers, of 475 Fifth Avenue, New York City, have purchasers for all types of aircraft. No charge for listing your ship for sale. Write for details, describing your airplane. "Airplanes Everywhere."

Wanted—Faster 4 Place Plane. Trade 1947 Super Cruiser, Osborn 4402 Groveland University Hgts, Ohio.

USED PLANES FOR SALE

BEECHCRAFT

BONANZAS: 31 from \$6225. Late painted 1949 A-35, #8903AS, has 525 hours. Engine 5 hours since factory major. Latest improvements. Exceptional. \$9000. Apply, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

D-18-S TWINS: 5 from \$43,100. Executive, #84373S, only flown 300 hours. Nose tank. Best radio with omni-range. ADF. New condition. \$55,000. Inquire, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

BELLANCA

CRUISAIRES: 22 from \$2600, 1947, #78356S, has 395 hours. Aeromatic. Primary blind. Radio. Loop. Fabric excellent. Relicensed January, \$3495. Also; August 1948, #78415S, with 130 hours. Aeromatic. Directional gyro. Radio. Landing lights. Exceptional finish. Spotless. \$4800. Offer wanted. Consult, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

CESSNA

Cessna 140's and 170's available. All good buys, #257-1946 140-450 hours total, radio, basic blind, lights, new license, \$1375. 3 Cessna 195's from \$10,750. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

ERCOUPE

Ercoupe 5 available from \$995. All private owners #520, 295 hours total, radio, lights, metal propeller, inspected to June 1952, \$1125. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

GRUMMAN

WIDGEOONS: 10 available. G-44, #62282S, has improved hull. 651 total hours, engines 195. Gyros. Radio. \$10,000. Also; 1947, G-44-A, #80640S, with 550 hours. Low time engines installed, and two overhauled spares. Metal propellers. Gyros. VHF radio. ADF. Clean. \$22,500. Apply, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

NAVIONS

NAVIONS 7 available #424, 490 hours airframe, 290 engine, radio, basic blind, lights, loop antenna, M.P. gauge, \$5400. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

NAVIONS: 48 from \$4125. Painted 1948, #4729KS, has 205HP engine. 200 hours total. Gyros. Omni-range. ADF. Custom upholstery over rubber. Exceptional. Bargain. \$7950. Also; late 1950, #5532KS, with 205HP engine. 94 hours. Auxiliary tank. Gyros. VHF radio. ADF. Platinum plugs. One owner. Hangared. New condition. \$13,000. Make offer. Inquire, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

SUPER 260: August 1950, #5634KS, has 80 hours. Omni-range. All late improvements. New condition. \$19,000. Make offer. Consult, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

ALL CLASSIFIED ADVERTISING

accepted with the understanding that it will be placed in the first issue closing after receipt of order. Classified forms close first of second month preceding date of issue.

All Classified Advertising Prepaid

NOORDUYNE

NORSEMEN: 4 from \$9000. All corrosion proofed. One float plane. Apply, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

PIPER

PIPER PA-11's, PA-12's, PA-16's, PA-20's available. All prices and exceptional values. We finance. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

REPUBLIC

SEABEES: 28 from \$1600. #6063KS, serial #946, has 190 hours. All late improvements. Never in salt water. No corrosion. Clean inside and out. \$2225. Make offer. Inquire, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

STINSON

165's: 30 from \$2250. 1948, #6905MS, has 366 hours cross-country. Metal propeller. Primary blind. Radio. Loop. One owner. Hangared. Undamaged. Exceptional. \$3000. Consult, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

STINSONS

STINSONS 9 Voyagers and Station Wagons, #461 Voyager 150, 650 hours total, 150 since major, 2-way radio, Omnigator with VHF, lights, a beauty. \$2290. We finance. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

SWIFT

125's: 20 from \$1725. Painted 1946, #72114S, has 340 hours. Aeromatic. Primary blind. Gyro. Radio. New 1951 canopy and windshields. New leather upholstery. Excellent. \$2200. Make offer. Also; 1948, #3217KS, with 259 hours. Aeromatic. Gyro. Radio. Bargain. \$2500. Also; 1950, #2836BS, with 238 hours. Auxiliary tank. Aeromatic. Gyro. Radio. Extras. Exceptional. Bargain. \$3300. Apply, **POWERS & GEORGE**, Aircraft Brokers, 475 Fifth Avenue, New York City. "Airplanes Everywhere."

AIRCRAFT LISTED WITHOUT CHARGE. AIRMART AIRCRAFT, aircraft brokers, 1930 South State, Chicago, Illinois have immediate buyers for all types of used airplanes. Write for details today. Airmart Aircraft, 1930 S. State, Chicago, Illinois.

AVIATION EQUIPMENT & SUPPLIES

GENUINE Navy Intermediate Flight Jackets, brand new, dark brown goatskin leather, bi-swing back, two patch pockets, one snap pocket, mouton collar, celanese lined, 100% wool knit waistband and cuffs, zippered, sewed with nylon thread. Sizes 34 to 46 Price \$35.00 each. The Genuine USN issue. Flying Equipment Co. 1641-5 W. Wolfram St. Dept. S, Chicago 13, Ill.

SWIFT GEAR POSITION INDICATOR Nonelectr shows each gear movement. Can't get out of order or adjustment. Chromplated last 1/2 of ship. Adds Safety & pleasure. We guarantee you will be tickled or money refunded. Child can install in 2 minutes. Kit \$5.00 Postpaid or C.O.D. AirEco, Box 6284, Jacksonville, Florida.

SUN GLASSES: Genuine Ray-Bans made Bausch & Lomb, gold filled frame. Ladies Gents style \$7.95 pair. Gents type with sweat bar \$10.95. Shooting Glasses with sweat bar \$13.00. Treat your eyes to the best. AN65 Goggle, clear lens \$3.25 pair. Flying Equipment Co. 1641-5 W. Wolfram St. Dept. S, Chicago 13, Ill.

GLOVES: B3A AAF Flying Gloves, da brown genuine kidskin leather with elastic take-up wrist, all sizes \$2.95 pair, new. Ray liners .50 pair. Flying Equipment Co. 1641-5 W. Wolfram St. Dept. S, Chicago 13, Ill.

MANDATORY RADIO AND FLIGHT PL bothering you? Build confidence with communication code, phonetic alphabet, identification decal on instrument panel. Send NC a \$1.00. Safetycals, 25 Woodridge, Munc Indiana.

HELMETS: ANH-15 AAF tan cloth, spon rubber earcups, new, \$2.00 each. A-11 AAF kidskin leather helmet, new \$3.45 each. Standard size. Flying Equipment Co. 1641-5 W. Wolfram St. Dept. S, Chicago 13, Ill.

MAE WEST Life Jackets, \$3.00 each, new. Cartridges 10¢ each. Coast Guard approved life vest \$3.00 each. B-11 Safety Belts \$2. Flying Equipment Co. 1641-5 W. Wolfram St. Dept. S, Chicago 13, Ill.

BATTERIES & TIRES: Brand new, for all type aircraft. Bargains. Send for free list. Many other items; write your requirements for quotation. Flying Equipment Co. 1641-5 W. Wolfram St., Dept. S, Chicago 13, Ill.

YOUR LEATHER JACKET renovated expert Free circular, Berlew Mfg. Co., Dept. Freeport, N. Y.

BOOKS

AVIATION QUIZ BOOKS—The following outstanding books by Charles A. Zweng let the field and prepare you for your rating. Included with each book are authentic examinations with new material not available elsewhere. Also included is a late Government Weather Map pertinent to the examination. Why take a chance? Zweng Books include: Flight Instructor \$3.50; Flight Engineer \$4.00; Link Instructor \$4.00; Private & Commercial Rating \$3.50; Instrument Ratings \$4.00; Meteorology for Airmen \$3.00; Aircraft & Engine Mechanic including hydraulics, weight and balance \$4.00; Parachute Technician Rating \$3.00; Flight Dispatcher \$4.00; Civil Air Regulatory \$1.00; Private Pilot Rating \$1.00; Airplane Operation and Management \$4.50; Zwen Aviation Dictionary \$6.00; Aeronautical Navigation \$3.00; Practical Manual of the E6B computer \$2.50; Ground Instructor Rating \$3.00; Flight Instructor Oral Examination \$1.00; Control Tower Operator's Flight Dispatcher covers most of the control tower examinations. \$4.00; Leading Airline Executives and Pilots owe their success to early training with Zweng Text Pan-American Navigation Service, 12021 Ventura Blvd., N. Hollywood, Calif. (Free Catalog.)

\$250 WEEK REPORTED! FREE BOOK "505 Outstanding Successful Businesses." Expect "Odd" Pacific—17A, Oceanside, Calif.

BULLET Raceplane. Homebuilt, Speedy, Low winged, Monoplane. Complete blueprint \$2.00. Corcraft, 81 Elmerston, Rochester 20, N. Y.

BOOKS, Continued

GUARANTEED: Ross Guaranteed Questionnaires are available for all C.A.A. ratings. They carry a full money back guarantee if you fail to pass your exams. Ross Questionnaires have been used by thousands of Pilots, Mechanics and Instructors with success. The frequent revisions insure your obtaining the very latest material. With a Ross Guaranteed Questionnaire you save time, Effort, and Money. Order direct or from your nearest Dealer. Engine Mechanic \$3.00; Aircraft Mechanic \$3.00; Both for \$5.00; Commercial Pilot \$4.00; Flight Instructor \$4.00; Instrument Rating \$4.00; Meteorology Instructor \$5.00; Navigation Instructor \$2.50; Aircraft Instructor \$2.50; Engine Instructor \$2.50; C.A.A. Instructor \$2.50; Fundamentals of Instruction \$1.00; As a special offer the complete set of the above Questionnaires are priced at only \$15.00; Ross Guaranteed Questionnaires are the only books available that include the same Navigation and/or Weather maps that are used by C.A.A. on their exams. Free folder on request. Orders at Postpaid or C.O.D. Ross Aero Publishers, Dept. 1-S, Administration Building, Commercial Airport, Tulsa, Oklahoma.

STUDENTS, MECHANICS, FLIGHT ENGINEERS: "Aero Mechanics Questionnaire" by Ralph Lee. A greatly enlarged and completely revised printed edition, 222 pages of multiple-choice questions, answers, and explanatory notes covering all phases of Aircraft and Engine Mechanics including Power Plants, Lubrication, Lubrication, Propellers, electricity, Woodwork, Dope and Fabric, Sheet Metal, Welding, Rigging, Weight and Balance problems, Hydraulics and Civil Air Regulations based on current issues. \$5.00 Postpaid, or c.o.d. plus postage. Address: Dixon Publications, Box 479, Lawrence, Kansas.

FLYING THE OMNIRANGE by Charles A. Meng. New "first edition" fully illustrated, designed to aid the pilot in flying the new omnirange Stations now being established by the C.A.A. Order now C.O.D. or postpaid. Deluxe edition only \$4.00. Pan-American Navigation Service, 12021-22 Ventura Blvd. Hollywood, Calif.

MAGAZINES (Back Dated)—Foreign, Domestic Arts, Books, Booklets, Subscriptions, etc. Catalog 10¢ (refunded). Cicerone's 86-22 Northern Blvd., Jackson Heights, N. Y.

HELP WANTED

FOREIGN & LATIN AMERICAN EMPLOYMENT. "Foreign Service Directory" gives Up-to-Date Minute Facts on Military & Civilian Commission, Government Jobs, Major Oil Lists, Aviation, Transportation, Steamship Lines, Mining, Importers, Exporters, How to Where to apply, application forms, List of Firms Hiring. \$1.00 postpaid. Global Reports, P. O. Box 883-SS, Hollywood 28, Calif.

JOBS: We can help you find the job you want! No registration fee. Send for application blank. **PILOTS EMPLOYMENT AGENCY**, Box 15289, Whippany, N. J.

INSTRUCTION

NAVIGATOR Rating Examinations included New Aeronautical Navigation by Charles Zweng \$3.00; Fairchild Surplus (Electrical Averager) Sextant \$17.50. **PILOTS** Supplement your training. Order "Ground Instructor" \$3.00 and "Ground Instructors' Rating" \$3.00. Examinations included. These books by "Zweng" prepare you for increased training power. Pan-American Navigation Service, 12021-22 Ventura Blvd. N. Hollywood, Calif.

JOBS: Prepare quickly for your CAA Private, Commercial, or Flight Instructor written examination, or the USAF Aviation selection qualifying examination. Complete instruction course with pertinent exam. Only \$6.00. Prepaid. Satisfaction or your money back—Guaranteed. American Air Institute, Adams, Mass.

Helicopter, build from spare parts or kit. Catalog and blueprints, \$5.00. No model. **ERO-TECH**, 601 Jefferson Street, Montgomery, Alabama.

INSTRUMENTS

NAVIGATION INSTRUMENTS: Beautiful new and reconditioned precision instruments. Brand new Link Aircraft Sextants with case \$37.50; Fairchild averaging type \$17.50; Bausch & Lomb Sextants, excellent condition, \$49.75; Hamilton 24 hour Master Navigation Watches \$65.00; Pioneer Panel Compass (new) \$17.50; Dalton Model "G" Computer (new) \$7.50; Weems Mark II Plotter \$2.00; Dalton E-6B Computer \$10.00; A-2 Deluxe Computer with case \$3.00; American Airlines Computer Model "D" high speed \$6.00; Astro Compasses (new) \$12.50. (Free Catalog) Pan-American Navigation Service, 12021-22 Ventura Blvd., N. Hollywood, Calif.

E-6B COMPUTERS. \$4.95, with leather cases \$5.45. Pioneer-Bendix B-16 Magnetic Compasses 3 1/2 inch, \$5.65. Famous Bausch & Lomb Sextants, averaging type A-8A, with carrying cases \$16.85. B-5 Driftmeters with powerful optical lenses \$15.85. Above items like new. VanDusen Map Plotters with directions (new) \$2.25. Money refunded if not satisfied. Kane Aero Equipment Co., 2308 N. E. 23rd St., Oklahoma City, Okla.

MISCELLANEOUS

AIRPLANE BUYERS AND SELLERS can now deal direct. No need to spend time and money chasing all over the country. We have every type of airplane listed in our files at prices hundreds of dollars less than those asked by brokers, because you pay no commissions or brokerage fees to middlemen. We tell you who own the airplanes you are looking for—you contact the owner—make your own deal—that's all there is to it. We'll even finance the purchase if you wish. Our only charge is a small \$5.00 registration fee to the seller, \$1.00 to the buyer. You will like our fast friendly service where everyone gets a good deal. Aircraft Listing Bureau, 1930 S. State, Chicago, Illinois.

SIKORSKY HELICOPTER R-6A. 2-place, side by side. Only 6 hrs. since new. NL Licensed until Feb. 1952. All bulletins completed, ship ready to go. Extras included: 1 set new Main Rotor Blades; 2 sets Tail Rotor Blades; 2 new and 1 used spare Main Rotor Hub Assemblies, and a complete set of floats. Has 700 lb. payload and 5 hr. gas supply. Will sell ship and all extra equipment for \$12,500. Demonstration on request. **LONEY'S AERO MARINA, INC., SWAN ISLAND, PORTLAND, ORE.** Ph. TRinity 1032.

PILOTS — MECHANICS — CAMPANIES — Seal your identification cards, pictures, licenses, placards in transparent plastic for life. Only \$1.00 for anything up to 5" x 7". Larger orders or sizes quoted on request with big discounts. Fastest mail returns postpaid. Send cash or check to Al Grossman, Box 221, Ocean Park, Calif.

AIRPLANE PHOTOGRAPHS: Send 25 cents for sample & lists. Leo J. Kohn 4952-A N. 54th Street Milwaukee 16, Wisconsin.

20th Century Magellans

(Continued from page 21)

missions a day. These missions cover an area extending from the frigid wastes off Shemya Island in the Aleutian chain to the muddy waters of the East China Sea.

Weather observations, including locating and tracking typhoons, is the principal reason for the 56th flying on these "weather tracks." Since the outbreak of hostilities in the Far East, more than half of the weather reconnaissance flights have been flown in support of United Nations forces over and adjacent to Korea. Weather data secured by the squadron is used by the ground forces, tactical aircraft and bombers within a few hours of the actual observations.

On average long-range transport and bombardment flights the navigator may deviate somewhat from his intended track as long as he takes the aircraft to its objective with a minimum use of fuel and maximum use of favorable weather conditions. However, the "flying weather stations" of the 56th must fly on predetermined weather tracks or routes. The weather reporting positions, located every 100 miles along the track, are also predetermined.

A weather observer forecaster seated in his office in the nose of a WB-29 makes the same weather observations that a ground weather station would make if it were located at that point on the earth's surface. It is the navigator's job to take the aircraft to each position and give the weather observer accurate meteorological data to be relayed to the 56th radio ground station in Japan.

This information immediately is compiled along with other weather data from the various weather stations.

When an aircraft takes off and climbs higher into the atmosphere, it moves through the air faster than at lower levels because the density of the air decreases. This rate of movement through the air, known as true airspeed, is the basis for determining the ground speed, or rate of movement over the earth, once the wind direction and velocity have been determined.

Once the true course to be flown is plotted on his chart, the navigator calculates the lateral distance the wind will blow him on either side of his intended track. This is known as "drift" and when added or subtracted from the true course it will give the true heading which has to be flown in order to make the course good.

Also, if the aircraft is moving through the air at a true airspeed of 250 mph, but is flying directly into a wind of 150 mph, the aircraft will be moving over the earth at 100 mph. Conversely, if the same wind was blowing from behind the aircraft it would add a 150 mph force to the 250 mph TAS and the aircraft would be flying 400 mph.

The modern Magellans no doubt encounter more complex problems in guiding their airplanes of supersonic speeds to far distance points of the globe, but from the crude techniques practiced by navigators on the wind-driven surface craft of Magellan and the earlier pioneers of centuries ago the same fundamentals of navigation have been amplified proportionately in keeping pace with the swiftness and range of the 20th century aircraft which now circle the globe in a matter of hours.



Join The Fight Against Inflation



BUY

U.S. DEFENSE BONDS

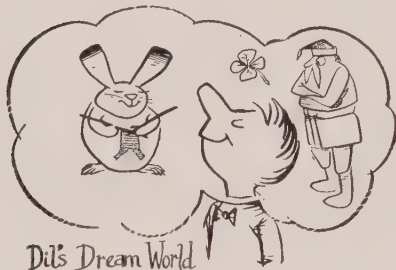
Dilbert

(Continued from page 30)

Santa Claus—In case you may have wondered how Dilbert got that way, here's the inside dope. To begin with, he was the only son of two misguided and doting parents. From the day of his birth, he was pampered and spoiled. His parents denied him nothing and tried to protect him from the cruel world. You can just imagine what a spoiled brat he was. As one of the neighbors cuttingly remarked, Dilbert's parents were "generous to a fault."



An example of how well Dilbert was shielded was that his voice had started to change before he learned that the dear little Easter Bunny didn't lay all those pretty colored eggs. When he found this out, he cried for days. Poor kid! One of the beautiful rose-colored windows through which he looked at the world had been shattered.



Dil's Dream World

Because he took this so hard, his parents just didn't have the heart to tell him the truth about old Kris Kringle. Believe it or not, Dilbert was almost old enough to vote before some of the older boys maliciously told him that jolly old elf was only a vicious figment of the imagination. He just wouldn't believe it . . . until, finally, his parents confirmed the sad truth of this hideous deception. Bang went another pretty window!

But youth is full of beans, and so, eventually, he recovered from that blow. His parents then tried to arouse his interest in the fair sex, but all he said was, "Going around with girls is sissy."

Instead, he started taking flying lessons. Was pretty darn good, too. His physical reactions were almost perfect, but his mental attitude left much to be desired. He was lazy-minded, sloppy and careless.

Which just about brings us up to date. Knowing Dilbert's background, one begins to understand how come his almost fanatical belief in Lady Luck. It is a natural; she is

his new window. If he doesn't wise up pretty soon, however, and stop depending on her so much, there's going to be another great disillusionment in our young hero's life. And this time, something besides a window is very apt to get busted.

Epilogue: Please don't misunderstand me. I'm not saying definitely there is no Lady

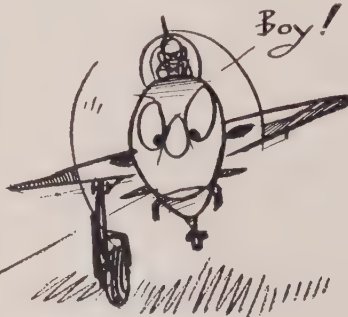


Who! ME! ☆

Luck. How else explain some of the miraculous crack-ups Dilbert has walked away from—even some of the tight spots you and I have wiggled out of. This much is certain, however: as far as aviators are concerned, Lady Luck always smiles brightest on those who pay her court by being careful and forehanded. You know; guys who, while they maybe carry a rabbit's foot, also make thorough preflight checks. They carefully plan their flights, and follow all the other safety precautions. Certainly you can't blame Lady Luck for bestowing on these deserving suitors her most bounteous favors.

No Pilot Error Here—Some aviators have an allergy to the term "Pilot Error" as used in the analyses of aircraft accidents. They get red in the face and break out in cuss words when they read or hear that "pilot error," year after year, is listed as being responsible for a large majority of all accidents. They claim that the method of analysis is all wrong; that many other causes are equally involved, and that, invariably, a disproportionate share of the blame is dished out to them.

For our money, no matter how many contributory causes may be involved (and they should all be ferreted out and steps taken to correct them) if the accident could have been prevented by better judgment or action on the part of the pilot, then "Pilot Error" must bear its share of the blame. Flying is fun, but it is also mighty serious business,



and the pilot must always assume the responsibilities of his position. Besides, it's his neck that is in jeopardy when he errs.

Now that that is off our chest, here's an accident in which the pilot was nowise to blame. In fact, he did a swell job of limiting the damage.

On coming in to land a fast single-engine job, this pilot could not get his left wheel down. He went back up and tried everything in the book, including bouncing the good wheel on the runway—but no soap. Finally, almost out of gas, he came in and made perfect one-wheel landing. He flew her over with his right wing low, and kept control until she slowed down and groundlooped on the left wing tip.

Examination showed that the gear jam was due to metallic burrs in the yoke bearing. The gear had been removed the previous week, at which time it was observed to be in good condition. There was unmistakable evidence of sand in the bearing.

The finger of guilt in this case points to the overhaul crew. They either carelessly left sand or grit in the bearing at time of reassembly, or failed to wipe off the zer fitting before using the pressure grease gun.

Such a little thing—such a costly little thing!

SETH'S SAFETY QUIZ

1. After descending from a flight on which oxygen was used, is it okay to come right in and land?
2. Is it necessary to taxi at high RPM in order to avoid fouling your engine?
3. During flight, how can you determine whether your artificial horizon is functioning and indicating correctly?

ANSWERS

No. Fly around for at least 15 minutes at 5,000 feet in order to give yourself a chance to return to normal, should you be lightly anoxic. No. To avoid engine fouling during taxi, be sure your idle mixture is set properly, and make a periodic engine run-up. First, check the suction-gage reading and then check the indication of the horizon against the rest of the instrument panel.

If they label this or Pilot Error I'm going to have a sudden stoppage in the head!

L/MF Decommissioning Postponed

ACC report outlines policy to be followed in switch to VOR system

by Col. N. F. Silsbee

Charles F. Horne, new CAA Administrator, has said, "We're here for a minimum of regulation and a maximum of service—and to every class of user of the airspace." A good example of this principle, which has also held good through the regimes of Delos W. Rentzel and Donald W. Nyrop, has been the approach to the thorny question of decommissioning the L/MF four-course radio-range stations. The program was to have started during fiscal year 1952, but as the result of a cooperative and thoroughly democratic process in which all the actual users of these facilities had a chance to speak their piece, it has been postponed. **Policy Setting** ► The main responsibility for setting the policy on this important

matter is not the CAA, but the top-level Air Coordinating Committee, which consists of representatives from the departments of Defense (Army, Navy, Air Force), Treasury (Coast Guard), Commerce (CAA), and State, with the Bureau of the Budget as an observer. One of ACC's important divisions is the Air Traffic Control and Navigation Panel (ACC/NAC-Panel for short) which arrives at national policy relating to all matters in this field.

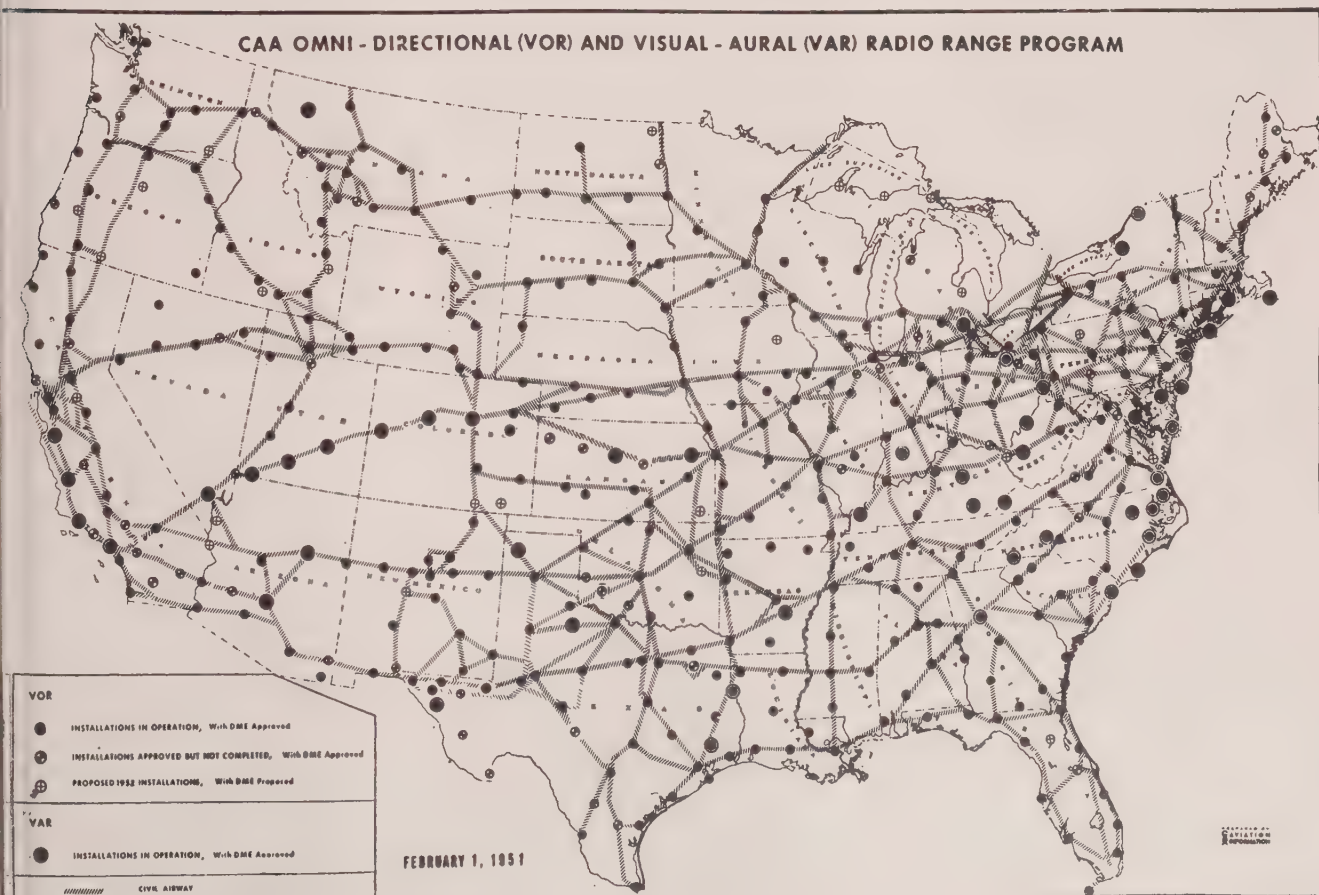
The ACC is an all-government agency, but it has an Aviation Industry Advisory Panel, members of which may not vote but who may, nevertheless, express their opinions in no uncertain terms. And it may be said that since Del Rentzel's

chairmanship of the ACC in particular, industry's voice has carried a weight which it has often lacked in the past. All decisions in the ACC, and thus in NAV-Panel, are based not on majority votes, but on the principle of unanimity, often arrived at after several sessions of give and take discussion.

It's important to get all this clear before we take a look at ACC 59/24.6N entitled "Aids to Air Navigation & Landing—policy to determine a schedule for the decommissioning of low/medium frequency four-course radio ranges" which was unanimously approved at the NAV-Panel's 56th meeting, June 21, 1951.

Revised ACC ► The final paper was a revision of ACC 59/24.6K dated May 31, 1951 and presented to the NAV-Panel by the Dept. of Commerce (CAA) at a meeting on June 13 at which this was the only subject on the agenda, which was entitled, "Discussion of VOR Utilization, Decommissioning of LF Ranges and Problems Pertaining Thereto." In addition to the regular members of the NAV-Panel, industry observers were

(Continued on page 58)



L/MF Decommissioning Delayed; ACC Report Outlines New Policy

(Continued from page 57)

present representing the scheduled airlines, corporation aircraft operators, private pilots, the airports, state aviation officials, and special representatives from the Radio Technical Commission for Aeronautics, Air Navigation Development Board, the CAB, etc.

Joe Blatt, chief of the Planning Division, Office of Federal Airways, made the presentation for CAA. He briefly summarized the original paper, and referred to three large outline charts of the United States, one of which showed the present pattern of VHF radio ranges, both VOR (Omni-Directional) and VAR (Visual-Aural). The other two charts provided a surprise for many in the room, in that they illustrated L/MF Broadcast Coverage and L/MF Air Route Coverage based on an estimated 78 stations for a national L/MF system which will continue in operation for some time after the main decommissioning program has been completed. Most people thought that once the program to cut out the L/MF radio range stations really started, they would all have to go within the 1952-1955 period. (See under *D. Conclusions*, items 1 and 2 (page 000), for the reasons for leaving a residual national L/MF system for possibly some years after the completion of the Transition Phase of the Common System).

Discussion ► After the presentation, Charlie Horne as chairman of NAV-Panel called for discussion, and a second invitation was not necessary! Here are just a few of the highlights of more than two hours of discussion by a wide variety of interests, a considerable portion of it not by regular NAV-Panel members but by aviation industry and user group "observers." It is also worth noting that practically all of the really important points are reflected in the revised paper.

AF Stand ► The Air Force pointed out that owing to their VHF-UHF airborne equipment program timetable they would be heavy users of L/MF radio ranges for some years to come, but felt that a start should be made in the decommissioning program by having the ACC's Regional Airspace Subcommittees survey all L/MF ranges, and that any determined to be unessential by all groups of users of the airspace, and not essential for air traffic control, navigation and national defense should be scheduled for early decommissioning. It was felt by all that this would apply to a very small number of such facilities.

ATA View ► The ATA opposed the starting of the decommissioning program in fiscal year 1952 on the ground of its deteriorating effect on air traffic con-

trol; it was felt that the VOR navigation system was not fully worked out as yet, that approach procedures had to be developed, and it favored postponing the start of the decommissioning program until the VOR system was practically ready to take over as the *primary* radio navigation system, and then make the transition from L/MF as rapidly as possible.

NASAO Opinion ► The NASAO (state aviation officials) was concerned with the critical problem presented to the Air Defense Command of aircraft flying at low altitudes and also planes not equipped with VHF during a period of military emergency when recall and other instructions would have to be transmitted; some of the state directors in the northwest felt that owing to the line-of-sight limitation on VHF, it was a serious question if VOR navigation could ever supplant L/MF in mountainous regions.

CAOA Stand ► The COA indicated that on the basis of letters from members in practically all parts of the country, VOR was not yet ready, and that few if any of the L/MF facilities should be cut out in 1952; availability of VHF airborne equipment was becoming a serious problem for newly modified corporation aircraft; in general, supported ATA and NASAO.

AOPA Claim ► The AOPA claimed that the L/MF system would be needed for some time to take care of the tremendous amount of VFR flying that goes on in this country, and supported NASAO in its contention that in certain areas of the country VOR in its present state at least did not meet the needs of private pilots.

As a result of the discussion, a small committee composed of representatives from the CAA (chairman), the military services (USAF) and industry (ATA) plus L. W. Burton, Jr., secretary of NAV-Panel, was appointed to rewrite the original CAA paper and have it ready for ACC approval on June 21. This was Special Working Group #6 (SWiG 6 if you like), and they certainly did an excellent job. The paper is worth a careful study, and extended extracts from it follow:

A. BACKGROUND

Predicated on the policy recommendations included in the report of RTCA Special Committee 31 dated May 12, 1948, and reaffirmed by the Operational Policy Group and the ACC/NAV Panel, the Congress and the aviation industry have been advised that completion of the omnirange program would permit the abandonment of the four-course radio range system operating in the low/medium frequency band. As a result of those policy statements and because of progress now made on the omnirange program, funds for the

operation of L/MF radio ranges in 1952 are expected to be reduced. This paper outlines the policy to be followed in the progressive decommissioning of the four-course L/MF radio ranges and explores the problem to be encountered prior to and during the decommissioning period.

B. STATUS

1. Ground Equipment

The CAA is presently operating 338 four-course L/MF radio ranges in the 200-400 kc band in the continental United States. There are at present approximately 325 instrument approach procedures authorized for civil airports using CAA operated L/MF four-course radio ranges. It is estimated that 419 omniranges will be in commission by the end of fiscal year 1952; 444 by the end of FY 1953 and 500 by the end of FY 1954.

The omnirange program contemplates operation of approximately 500 equipments, including both the enroute and terminal facilities. There are 419 VOR's authorized through FY 1951, of which approximately 300 have been commissioned to date. The omnirange program, as planned, is expected to afford approach facilities for approximately 455 civil airports. The present criteria for instrument approach service using omnirange requires locating these facilities within 12 miles of the airport to be served. Seventy per cent of the sites presently selected are so located.

2. Airborne Equipment

The availability of a suitable low cost, lightweight receiver will in large measure effect the transition from L/MF to VHF facilities. The lack of a positive plan for the decommissioning of L/MF radio ranges only tends to curb the potential market for this omnirange receiver equipment and its further development, creating the situation of "which comes first, the chicken or the egg?"

It is emphasized, therefore, that until such time as definite plans for decommissioning are agreed upon, very little incentive will be created to expedite the airborne installation program in an orderly manner.

Information available to the CAA indicates that production of VOR receivers for non-air-carrier civil aircraft is progressing quite satisfactorily. It is estimated that there are presently 4500 VOR receivers installed in these civil aircraft. Production estimates call for an additional 5100 equipments to be manufactured during the last

(Continued on page 61)

DPA Recommends CAA Use DO-45 Ratings; Radio Makers Authorized to Obtain Materials for Production

Early this year the CAA's Office of Aviation Defense Requirements made inquiries to radio manufacturers of VHF airborne radio communications and navigation equipment concerning their plans and requirements for producing this equipment for non-air-carrier aircraft during the second, third and fourth quarters of calendar year 1951.

On receipt of the above information a program was submitted to the Defense Production Administration. Early in June the DPA recommended that the CAA use DO-45 ratings for this program. This action was taken to expedite the fuller utilization of the CAA omnidirectional radio range (VOR) system, since both low frequency (LF) and very high frequency (VHF) systems are now in operation.

The following manufacturers were authorized by telegram to use DO-45 to obtain the materials required in the fabrication of VHF radio equipment within dollar limitations established for each manufacturer: Aircraft Radio Corporation, Boonton, N. J.; Bendix Radio Div., Baltimore, Md.; Collins Radio Corp., Cedar Rapids, Iowa. These three companies account for about 1,000 of the more expensive airline-type units.

Some 4100 of the lightweight sets will be produced by Lear, Inc., Los Angeles, Calif.; Mitchell Industries, Mineral Wells, Texas; and National Aeronautical Corp. (NARCO), Ambler, Penna. As the decision was not made until a very few weeks before the Controlled Materials Plan (CMP) went into effect (July 1st), some of the companies were not able to arrange their schedules in time, but promise deliveries of equipment by early fall.

New VHF Channels for Company Plane Communications

Although VOR (VHF Omnidirectional Radio) ranges for navigation have had most of the publicity in connection with the transition phase of the Common System now being developed and installed throughout the country, a very important part of the program is concerned with greatly improved communications facilities in the VHF band.

This is the real significance of the FCC's recent announcement of an amendment to Part 9 of its *Rules and Regulations Governing Aeronautical Services*. This has been done to provide certain new frequencies within the band 118.1-126.7 mc for use by aircraft and ground stations.

Purpose of Change ► The purpose of the change is to enable *all* aircraft, regardless of type, which operate under IFR conditions (instrument weather), to be equipped with the same frequencies in order to facilitate the control of traffic by airdrome control stations.

This will enable properly equipped corporation aircraft (and most of them are properly equipped) to operate in exactly the same way under instrument conditions as the scheduled airliners, instead of being regarded (radiowise) as "Private Aircraft Stations" confined to 122.1-122.9 mc for air-to-ground communications. Many company aircraft pilots have for some time been forced to use some of these very frequencies to get any attention at all, but now it's legal!

New Freq. ► Here is a list of the new frequencies:

118.3	121.1
118.5	123.7
118.7	123.9
118.9	124.1
119.1	124.3
119.3	124.5
119.5	124.7
119.7	124.9
119.9	125.1
120.1	125.3
120.5	125.5
120.7	125.7
120.9	125.9

These channels are now available for air-traffic-control operations.

118.1 is primarily for international operations.

120.3 is primarily for communications with Air Route Traffic Control Centers (ARTCC), the "direct to center" line.

121.3 is for communication with low activity airdrome control stations (smaller airports).

121.7 is available on a secondary basis to its primary use as an airport utility frequency.

126.1 and 126.3 are available on a non-interference basis to government use (USAF) of 126.18 mc, for which there will be a diminishing requirement as the Air Force UHF program for tactical aircraft communications is implemented.

126.7 is for communication with Interstate Airway Communication Stations (INSACS).

All of the above channels are for Single Channel Simplex (SCS) operation with 200 kc channel spacing (odd tenths of megacycles) for the 1951 through 1953 period.

The FCC announcement is the result of an elaborate study and recommendations of the Radio Technical Commission for Aeronautics' Special Committee 56 (RTCA SC56) made at the request of the top level Air Coordinating Committee's Air Traffic Control and Navigation Panel (ACC NAV-Panel).

(Continued on page 60)

CLEAR COMMUNICATION OMNI NAVIGATION

WITH **VHF**
A.R.C. EQUIPMENT



**Fly Directly
in Less Time—
Keep All Signals**

STATIC FREE!



Get static-free communication and the added reliability of omni range navigation by installing A.R.C.'s Type 17 2-way VHF Communication and Type 15B Omni Range Navigation Equipment. With the 15B tuned to the VHF omni stations now covering the country, you fly directly in less time. You can receive weather broadcasts simultaneously with the navigation signals—*static free!* The 15B takes the work out of navigation and provides long, trouble-free life. The Type 17 provides an independent communication system for use while the 15B is busy providing navigational information. Other A.R.C. equipment provides LF range and broadcast reception, and rotatable loop navigation.

All A.R.C. Airborne equipment is Type Certified by CAA. It is designed for reliability and performance—not to meet a price. Installations for both single and multi-engine planes are made only by authorized service agencies. Write for further details or name of your nearest A.R.C. representative.



Aircraft Radio Corporation
BOONTON, NEW JERSEY

ENGINEERING DEGREE IN 27 MONTHS

INDIANA
TECHNICAL
COLLEGE

ENGINEERING: B. S. DEGREE IN 27 MONTHS. Aeronautical, Chemical, Civil, Electrical, Mechanical and Radio Engineering (inc. television). Drafting, 1-yr. Gov't approved for G.I.'s. Low rate. Earn board. Large industrial center. Students from 48 states, 21 countries. Demand for graduates. Enter Sept., Dec., March, June. Write for catalog, 291 E. Washington Blvd., Fort Wayne 2, Indiana.

SKYWAYS Subscribers

If you move . . .

Send change of address to J. Fred Henry Publications, Inc., 444 Madison Avenue, New York 22, N. Y., at least six weeks before the date of the issue with which it is to take effect. Send old address with the new, and if possible send your address label. Copies will not be forwarded by the postal service unless you supply the necessary extra postage.

New VHF Channels for Company Plane Communications

(Continued from page 59)

Procedures ► Operational procedures intended for immediate implementation require the use of additional frequencies in the VHF band for communication. The SC56 Report 38-51/DO-31 dated March 26, 1951 lists the frequencies expected to be required during the period 1951 through 1953 and describes how these frequencies can be implemented, consistent with their future use, employing existing VHF equipment (in some cases with minor modification).

There are seven air-traffic-control functions in connection with traffic control of aircraft approach or departure from a terminal which may require frequency assignment for direct traffic controller-pilot communications. These functions are as follows:

A. In-bound Air Route Traffic Control (Center).

To provide separation and orderly sequencing of aircraft approaching a terminal until such aircraft are released to the jurisdiction of the Tower.

B. Approach Control (Tower).

To provide separation of IFR air traffic approaching to land at an airport and maintain an orderly flow of this traffic from the time it leaves the jurisdiction of the Center.

C. Local Control (Tower).

To provide separation between aircraft landing or taking off at an airport (especially during the contact period).

D. Ground Control (Tower).

To provide separation between aircraft and obstructions in the movement area, and issue air traffic control clearances to IFR departures.

E. IFR Departure Control (Tower).

To provide separation between departing IFR aircraft and other IFR aircraft under Tower jurisdiction from the time the aircraft leaves the jurisdiction of the Local Control until it comes under the jurisdiction of the ARTC Center.

F. Out-bound Air Route Traffic Control (Center).

To provide separation and orderly sequencing of aircraft departing from a terminal after such aircraft leave the jurisdiction of the Tower.

G (c). Radar Control (Center).

To provide navigational guidance and advisory information by reference to a radar scope.

G (t). Radar control (Tower).

To provide navigational guidance

and advisory information by reference to a radar scope.

(Note that A corresponds to F, and B to E, in reverse).

A glance at the current Airman's Guide will show the VHF frequency situation at LaGuardia Airport, for example. VHF transmitter frequencies guarded include 118.1, 118.7, 119.9, 120.3, 121.5, 122.1, 122.5 and 126.18. For ILS approach the localizer frequency is 109.9 mc, and that of the glide slope receiver 333.8 mc in the UHF band (this has to be a separate unit, usually a war surplus R89B, a modified R89B, or a Collins 51V).

In addition, the ASR (Airport Surveillance Radar) transmits on 109.9, 118.7, 119.9 and 120.3 mc, necessitating a multi-channel VHF receiver in the plane with frequencies available over and above those hitherto required.

During the past two years, the Office of Federal Airways has gradually implemented a procedure in which the controllers at the busiest ARTC Centers talk directly to the pilot of each plane, and vice versa, rather than transmit information through the Control Tower. This in itself has increased the need for more VHF frequencies, but it has also advanced the efficiency of the entire traffic control operation. Most of the ARTCC use 120.3 mc for this, but Detroit, Pittsburgh and St. Louis use 118.9 at present.

Equipment ► Pilots fortunate enough to fly aircraft equipped with the Collins VHF system (17L transmitter, 51R receiver, 51V glide slope—see *NAVICOM* section of *August SKYWAYS*) are sitting pretty for both the present and foreseeable future. Other equipment which meets airline standards includes the A.R.C. Type 17 VHF communications

system (T-11 five-channel transmitter and R-15 receiver, with the 15C navigation receiver for VOR and ILS localizer) and the Bendix.

War surplus VHF communications equipment includes the 10-channel ARC-1 and 8-channel ARC-3. Both are transceivers, using the same circuits for transmitting and receiving. To meet the new requirements for more channels, ARC-1 can be converted to a 50-channel set with the AEROCOM modification kit (*August SKYWAYS*, *NAVICOM* section). According to one of the top engineers at Aeronautical Radio, Inc., this modified ARC-1 is going "great guns." The ARC-3 has been converted into a 24-channel or 32-channel unit by Schut

tig & Co., Washington, D. C. Both of these sets are bulky and heavy, however, and as the principal need is for more channels in a VHF transmitter, modified versions of a lighter weight war-surplus transmitter unit only is in order.

Pilots of some company aircraft which are equipped with the A.R.C. VHF system are simply adding one or two extra A.R.C. Type 11 transmitters, if they can get them. Actually 10 channels is hardly enough today, with 20 or more on the horizon for tomorrow. Each pilot is urged to make a study of his probable requirements for the immediate year ahead in the light of these new developments.

Airborne VHF equipment has been increasingly difficult to get, but a recent decision of the Defense Production Administration has provided the necessary materials to the aircraft radio industry for the production of a considerable number of new VHF sets for "non-carrier" aircraft; the military and the scheduled airlines having previously been taken care of.

CONTROL TOWER at LaGuardia Airport, New York, directs total of 200,000 aircraft movements yearly; is second largest number of yearly aircraft movements recorded in the U. S.



L/MF Decommissioning Delayed; ACC Report Outlines New Policy

(Continued from page 58)

three quarters of calendar year 1951. A total of 9600 VOR airborne equipments should be in use in civil aircraft by January 1, 1952. It is understood that procurement is well underway for VHF navigation-communication receivers for military aircraft. It is further indicated that new military non-tactical aircraft are scheduled for the installation of this equipment prior to delivery. However, at the present time the great majority of the military aircraft are not equipped with omni-receivers and it is estimated that it will not be until approximately 1958 before military navigational requirements will be independent of the low/medium frequency four-course ranges.

Emphasis is placed on both the extreme importance of expediting the military airborne equipment program, and the establishment of an airborne equipment implementation schedule so that planning of the L/MF to VHF transition program will effectively meet military non-tactical requirements.

As of July 1, 1951, 52.5 per cent of the scheduled airline fleet, including miscellaneous aircraft, will be equipped with at least one VOR receiver. By January 1, 1952, at least 89.1 per cent of the airline fleet will be equipped with at least one VOR receiver. This percentage will be somewhat higher since all new aircraft being delivered are equipped with dual VOR receivers.

3. Procedures

The CAA Office of Aviation Safety has approved a considerable number of instrument approach procedures for existing VHF omnirange facilities. The authorized minimums are at least as low as those now authorized for L/MF ranges. Use of markers and/or cross checks on the approach course will permit reduction of let-down minimums in accordance with criteria now in effect. Indications are that after a period of operational use, minimums may be reduced to below those authorized for L/MF facilities under the same operating conditions.

FACTORS GOVERNING THE DISCONTINUANCE SCHEDULE

It would be an ideal situation if the transition from L/MF to VHF operation could be accomplished without

causing any inconvenience to the users. Inevitably, however, the transition from L/MF to VHF navigation must cause some inconvenience to the user and will result in some loss of efficiency in air traffic control. Consequently, the transition should be accomplished over as short a period of space as possible in order to minimize the hardship on the users and the effect of the transition on the air traffic control functions. The selection of the date on which to initiate the decommissioning schedule is dependent on the:

- (1) degree of inconvenience which can be tolerated by the users;
- (2) degree of efficiency which can be achieved during the period insofar as air traffic control is concerned; and
- (3) availability of federal funds to continue the operation of the obsolescent L/MF facilities.

Air Traffic Control to be efficiently operated is dependent upon adequate communications with the aircraft being controlled and immediately available intelligence as to the aircraft's position and altitude. Furthermore, Air Traffic Control is dependent upon the ability of the aircraft under its control to hold at designated points and to otherwise use navigational facilities upon which the efficiency of Air Traffic Control is dependent. As a consequence, the ability of the users to use the primary navigation facilities for traffic control aids determines for the most part the efficiency of Air Traffic Control. If there is a premature decommissioning of LF facilities, one of two results must be obtained:

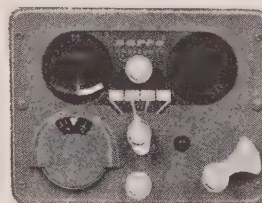
- (1) either the movement of non-VOR equipped aircraft must be restricted; or
- (2) acceptance made of the fact that some deterioration of Air Traffic Control will result.

Although it is recognized that air traffic control procedures must be complex while concurrent use is made of the L/MF and VOR systems and that this complexity results in less efficient control, nevertheless the acceptance and use of the VOR as a primary aid following completion of the decommissioning schedule will result in a simplification of air traffic control and navigational procedures. For maximum efficiency, non-VOR equipped aircraft may be required to accept some restriction when the VOR becomes the primary aid.

The military aircraft in terms of plane movements and numbers are the primary users of the L/MF ranges due to the demands which have been imposed upon the military for the national defense and the increased

(Continued on page 62)

New! Low Cost! OMNIHOMER



OMNIHOMER

Now, a complete omni range and two way VHF in one Low Cost Unit. The new OMNIHOMER is precision built for peak performance. Installation is convenient: all controls incorporated in one simple panel, size 5 1/4" x 6 1/2" x 10 1/4" and weighs only 10 lbs. installed. See your NARCO Dealer.

DELUXE

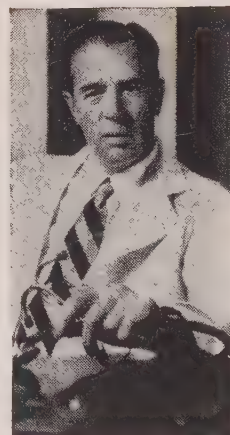
For those who desire the finest in omnigation, NARCO'S VTR-1 Omnigator has all the above features, PLUS ILS, marker beacon receiver, and 8-channel VHF transmission.

narco

NATIONAL AERONAUTICAL CORPORATION

AMBLER, PENNA.

Perfection in electronics



"Is it too late, Doctor?"

It's *not* too late for Americans who go to their doctors at the first sign of any one of cancer's 7 danger signals: (1) any sore that does not heal (2) a lump or thickening, in the breast or elsewhere (3) unusual bleeding or discharge (4) any change in a wart or mole (5) persistent indigestion or difficulty in swallowing (6) persistent hoarseness or cough (7) any change in normal bowel habits.

Guard yourself against cancer. Phone the nearest office of the American Cancer Society or simply write to "Cancer."

American Cancer Society

L/MF Decommissioning Delayed; ACC Report Outlines New Policy

(Continued from page 61)

mobilization effort of the country. Military and other aircraft have not yet been equipped with the VOR receiver in sufficient quantity to predicate operation on the basis of the VOR being the primary navigational aid. Premature initiation of the decommissioning schedule of the L/MF radio range before the using agencies are ready to accept the VOR as a primary aid would:

- (1) further complicate the already complex air traffic control procedures because of the resulting loss of LF holding fixes and en-route navigation;
- (2) have a serious effect on the assigned defense functions of the military; and
- (3) impair the nation's mobilization effort in that severe restrictions would be experienced in the operation of essential military and civil aircraft movements.

Because the majority of the aircraft are not yet equipped to use the VOR as a primary navigational device and because the military, particularly, cannot accept the type of restrictions of the operation which would be necessary if decommissioning were com-

menced at this time, it must be concluded that because of the national defense the CAA program to decommission the four-course L/MF ranges must be deferred until the majority of the using aircraft are ready to convert and use the VOR as a primary aid. This conversion should take place in as short a space of time as possible. It is apparent however that total decommissioning of all four-course L/MF ranges now operated by the CAA would create serious problems until some substitute has been developed to perform certain communications and navigational functions which the VOR is unable to furnish unless the VOR program is greatly expanded. The following is an attempt to enumerate the more obvious problems:

1. Navigation

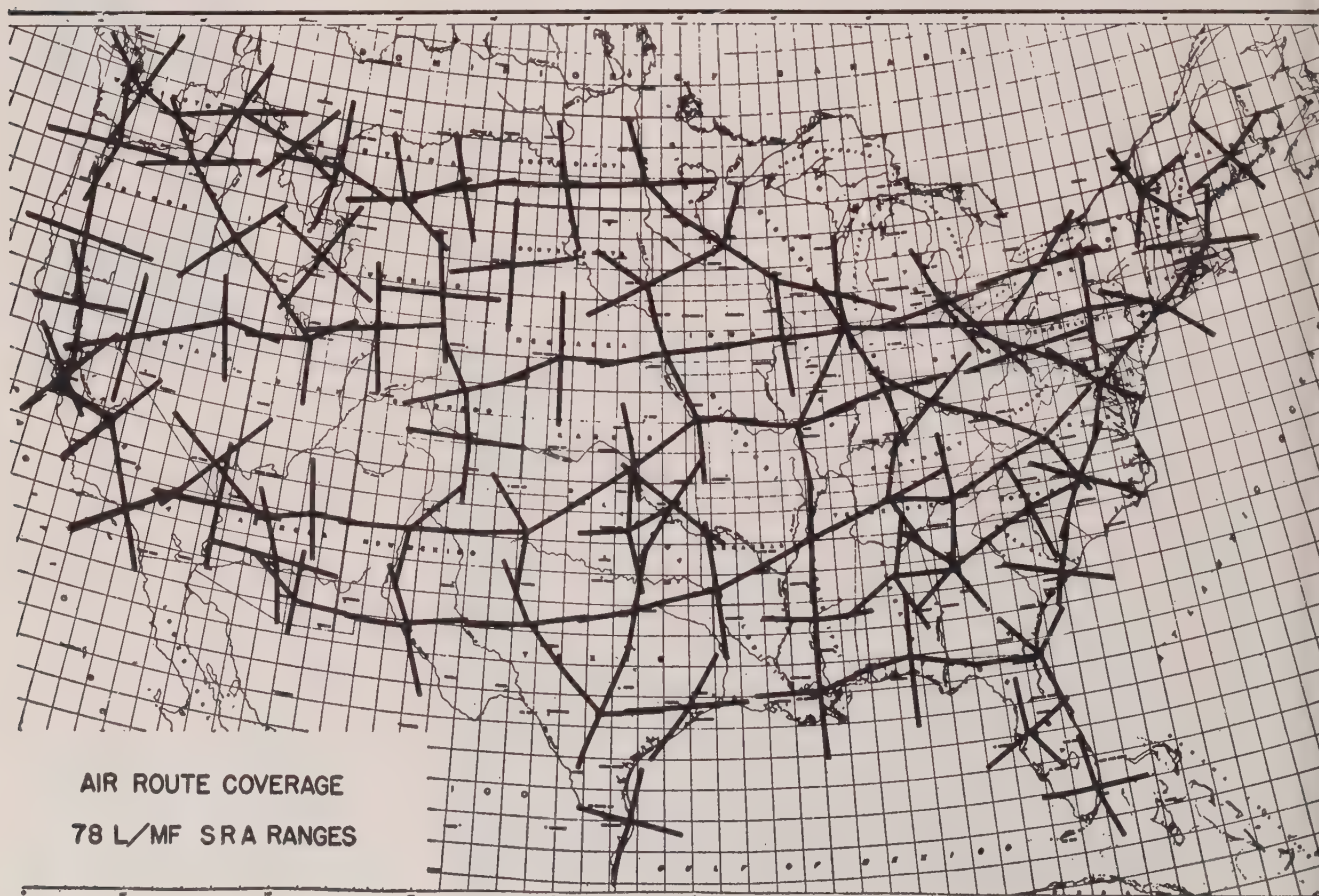
- (a) There are indications that future high-speed jet operations will pose navigation and air traffic control problems which may or may not be initially satisfied by the VHF system. It is expected, however, that the VHF system eventually will meet normal high altitude domestic navigation and communications requirements. (RTCA Special Committee 57 has been established to study this problem and to determine if the VHF omnirange meets

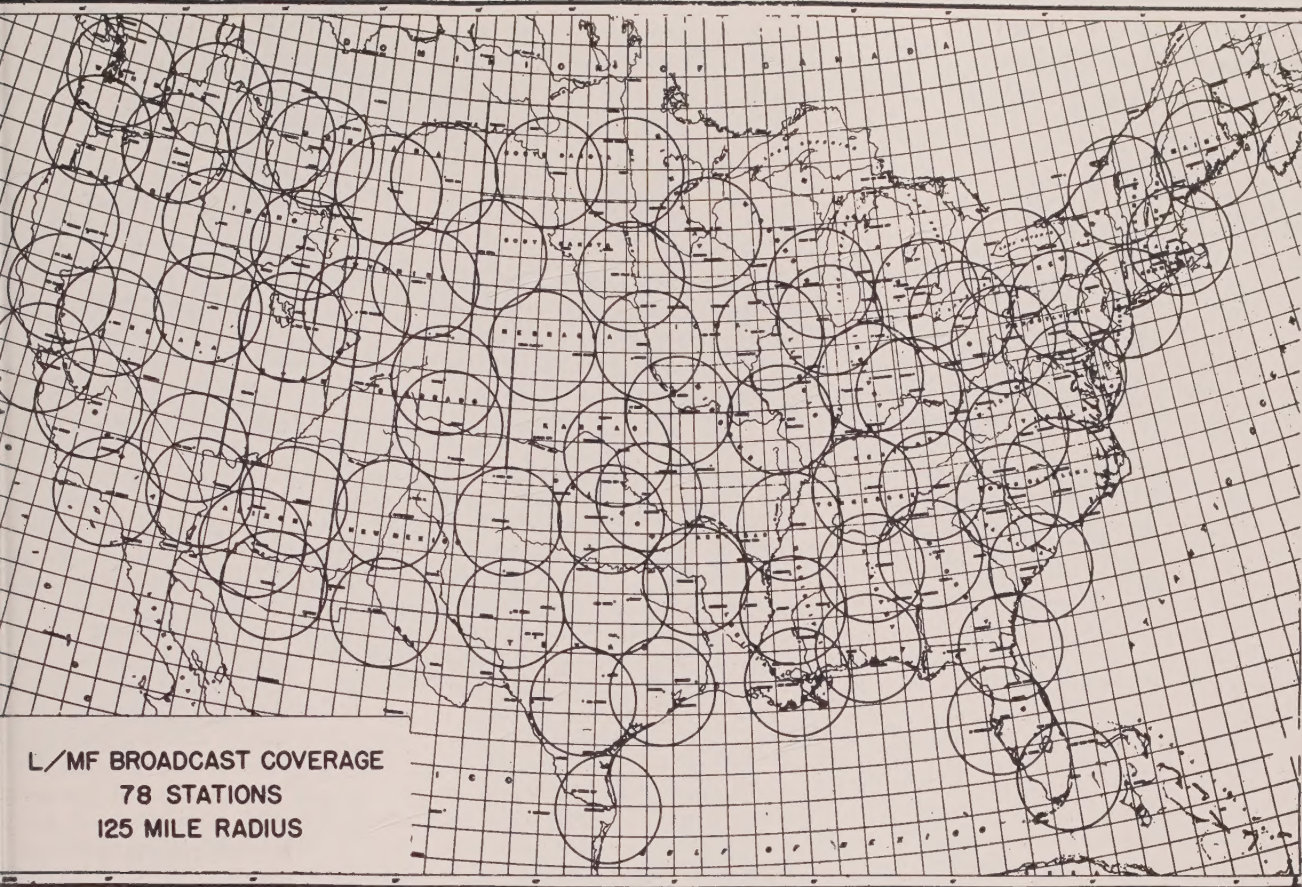
the operational requirements for high altitude flying.)

- (b) There is a requirement to provide a limited L/MF airway system in the continental United States for a variety of purposes, such as cross-country VFR and IFR operations, forestry service, and in areas where generally VOR reception at low levels would not be available.

2. Communications

- (a) Since the VHF omnirange is limited to line-of-sight navigation and communications services, the omnirange will satisfy the communications requirements of operators of small airports in many areas who do not have drops of meteorological teletype circuits.
- (b) Aircraft operating at low-altitude levels outside the service area of VHF facilities and aircraft not equipped with VHF both on cross country and local flights, will present a critical problem to the Air Defense Command during a period of military emergency. It is essential that the CAA retain the ability to transmit recall and other instructions which are pertinent to directing aircraft movements to meet re-





tional defense requirements.

- (c) During periods of military emergency, it is essential that the CAA retain the ability to notify all aircraft and airport operators as to the conditions of alert. The VHF omnirange communications channel does not meet this requirement.

CONCLUSIONS

1. The total decommissioning of all four-course L/MF radio ranges will create serious communications and navigation problems.
2. Until these communications and navigation problems are adequately resolved a limited national L/MF airways system should remain in operation.
- (a) A map study indicates a limited national L/MF airways system can be provided by retaining approximately 78 selected Simultaneous (voice and signal) Range Adcock (antenna, not loop) radio ranges and operating these ranges at full power (400 watts). It is believed that these 78 full-powered ranges can be so located that, taking into consideration attenuation, terrain, frequency, area coverage and route coverage problems, they will adequately meet the communications and navigation requirements for L/MF

facilities during a transition period.

- (b) The full-powered SRA ranges which will remain in operation for an interim period should provide continued scheduled weather broadcasts in the 200-400 kc band with no degradation of service.
- (c) The full-powered ranges should provide a low frequency aural airway route system to serve the more densely travelled cross-country routes.
- (d) The facilities of the national L/MF airways system should blanket the country, thus making it possible to furnish alert and recall instruction to aircraft under military emergency conditions. This provision should reduce restrictive security controls to a minimum.
- (e) These remaining ranges will provide a national L/MF system for high-speed, high-altitude operations.
- (f) Two-way voice communications should be retained on all of the 78 remaining L/MF facilities.
3. The majority of the civil users of the airways under IFR conditions will be equipped to use the omnirange by January 1, 1952. However, the largest single user of the

airways, military aviation, will not be equipped with omnirange receivers by that date. (It is estimated that military aviation will account for over 41 per cent of the fix postings by January 1, 1952). Therefore, national defense requirements dictate that the decommissioning schedule not begin until at least fiscal year 1953.

4. Since the concurrent use of omniranges and L/MF four-course ranges results in less efficient control, the L/MF decommissioning program should be accomplished in the shortest period of time operationally and economically feasible. As long as the L/MF facilities are designated as the primary navigational aid, omni-equipped aircraft will receive little or no traffic control benefits. When the majority of the airway users, utilizing the airways under IFR conditions, are equipped to fly the omniranges, the omniranges should be designated as the primary navigational aid. After the designation of the omnirange as the primary system, the rapid decommissioning of the four-course L/MF ranges will assist in simplifying the air traffic control problem and increase the efficiency of control.
5. It appears that no great air traffic

(Continued on page 64)

L/MF Decommissioning Delayed; ACC Report Outlines New Policy

(Continued from page 63)

control problem exists in low traffic density areas, and it is therefore proposed to confine the first phases of decommissioning to these areas. It is the general plan to discontinue the operation of L/MF four-course ranges on a route or airways segment basis on low traffic density routes where adequate VOR service is provided.

6. Prior to effecting decommissioning of L/MF four-course ranges in high density traffic areas additional VOR facilities should be installed to obtain adequate lateral separation.
7. The proposed decommissioning plan requires the classification of the L/MF ranges with respect to their operational use in order to give adequate consideration to the priority assigned each facility or groups of facilities to permit optimum operating efficiency of the system during the transition period. The L/MF ranges are classified by operational use in the priority order for decommissioning as follows:

1st Phase:

Class 1—Facilities determined to be unessential by all users of the airspace and not essential for air traffic control, navigation and national defense.

2nd Phase:

Class 2—Facilities serving as terminal aids at airports having low traffic activity and which are not essential for airway enroute L/MF navigational coverage.

Class 3—Facilities primarily used as L/MF aids for enroute navigation on airways having full VOR coverage at the minimum instrument altitude, between terminal airports with approved approach procedures using an ILS or VHF omnirange.

Class 4—Facilities used as L/MF aids for instrument approach to major airports served by either ILS or VHF omniranges.

3rd Phase:

Class 5—Facilities required for national L/MF system (the estimated 78 full-powered SRA radio ranges).

8. The priority of decommissioning normally should be determined by the degree of usage of L/MF facilities, and the status of VHF omni-range implementation as a replacement aid.
9. Prior to the initiation of the decommissioning schedule all decom-

missionings of L/MF facilities should be limited to those facilities as described in Conclusion 7, Class 1, above.

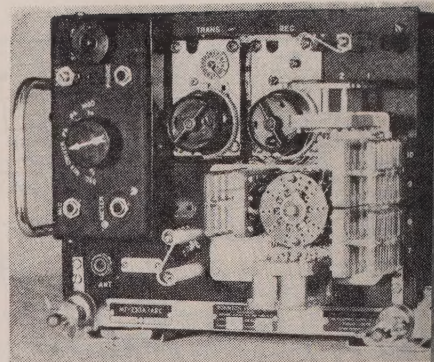
10. The selection of specific place names for incorporation in a discontinuance program can be made only after local study. The ACC/Regional Airspace Subcommittees should be used in making the local study.

RECOMMENDED ACTION

1. The Air Coordinating Committee/Regional Airspace Subcommittees should be directed to immediately survey all LF ranges to the end that those facilities falling in the first category as set forth in Conclusion 7, Class 1, above, will be decommissioned during fiscal year 1952.
2. Based on the factors and conclusions stated in this paper, the schedule for decommissioning facilities other than included under Item 1, above, should not be commenced until at least fiscal year 1952.
3. That the decommissioning schedule, once started, should be carried to conclusion within a period of two years, as follows:
1st Year—approximately 30 per cent of facilities in Classifications 2, 3, & 4
2nd Year—remaining facilities in Classifications 2, 3 & 4
 (Following Years—Facilities in Classification 5 to be retained as long as necessary.)
4. Not later than February 1, 1952, the ACC/NAV Panel should have completed a review of the factors governing the decommissioning schedule to the end that the CAA budget for fiscal year 1953 may be established.
5. The factors governing the decommissioning schedule be reviewed by the ACC/NAV Panel every six months until it is determined that the schedule may be initiated.

VHF Conversion Kit for ARC-1 Announced by Aeronautical Communications Equipment, Inc.

Pilots of company aircraft who have been out beating the bushes to acquire up-to-date VHF transmitters with enough channels to get them in and out of our highly saturated terminal airports will be interested to learn of a conversion kit for the wartime ARC-1 VHF 10-channel transceiver which will provide it with up to 50 frequencies. It is manufactured by Aeronautical Communications Equipment, Inc. (AEROCOM), Miami, Florida.



ARC-1 converted to 50-frequency VHF set

The ARC-1 ("A" for airborne, "R" for radio, and "C" for communications—pronounced "ark-one," and not to be confused with A.R.C., the initials of Aircraft Radio Corporation of Boonton, N. J., with its well known ARC-151 omni receiver, etc.) is a late wartime development of Navy and Aeronautical Radio, Inc. (Aerino.) During 1944-45 it was used extensively in NATS transport aircraft and in carrier-based fighters and attack planes. As a useful war-surplus unit, it is widely used by airlines.

The purpose of this modification is to increase the number of frequencies which may be accommodated by the RT-18/ARC-1 unit. A maximum of 50 crystals, five crystals per channel is provided, but whether or not the entire 50 frequencies becomes practically available in any given installation depends on the pattern of frequencies required. The RTCA Special Committee 56 (S-56) has made an exhaustive study of the ARC-1 modification, and has reported that it is suitable for the five channels in the 118 mc bracket (118.1, 118.3, 118.5, 118.7, 118.9), all five in 119, 120 and 121; also all five in 124 and 125. 126.7 mc are also recommended. This uses up some 32 of the 50 frequencies provided by the AEROCOM modification, and they are far and away the best ones to have to meet both airline and company aircraft requirements. The remainder of the frequencies can be used for company communications, etc.

A more complete report on the ARC-1 modification will be provided in a subsequent issue, but this much is made available now.

For full information, including a report by Pan American World Airways on this conversion kit, write AEROCOM, 3090 Douglas Road, Miami #3, Florida. Price of the kit for direct sale has been set at \$125, but normally sale to company aircraft operators will be through dealers who can make the installation, modifying an original ARC-1 and shock mount from 10 to 50 frequencies including AEROCOM kit and other materials, plus labor, at an estimated price of \$230. Remote control selector switch (made by Gables Engineering, Inc., Coral Gables.) Is not included in the kit.

SPOTLIGHT IN KOREA

CARGO PLANE GUIDES AIR DROP IN STORM

AN AIR BASE IN JAPAN, Jan. 11—Flying Boxcars dropped critically needed supplies to infantrymen in Korea last night during a snow storm so dense one of the big planes had to guide the others for four hours to guide the others to the right place.

The pilot who flew his loaded C-119 from this air base, said he arrived at the designated spot after fighting a heavy snow storm for two hours and dropped his cargo.

With darkness closing in the pilot realized other transports would have a hard time finding the area.

He climbed to 4,000 feet, leveled off and circled. His co-pilot contacted other C-119s en route to the drop zone. As each plane of the 314th Combat Cargo Wing reached the area, the hovering plane flashed on its landing lights. The other planes then swooped down and dropped their cargoes.

Adv
Span
On

21st

Jan.

exclaim

an air

gates o

"We

the A

legs

his "I

happen

"I'd

the bar

"but I

to my

"I t

this su

out of

Pilin

shiver

21st

room.

Burde

Wiscon

"Wh

as he

with a

could

stances

so bold

he add

"We

like th

less



ENGINE AND AIRPLANE CORPORATION
FAIRCHILD

Aircraft Division
HAGERSTOWN, MARYLAND

BLAIR CHOOSES LEAR FOR RECORD FLIGHT OVER NORTH POLE

WESTERN UNION

1220

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

SYMBOLS

DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

LB242 SYA718 SY.HEBO 16 NL PD
PORT WASHINGTON NY JUN 5 1951

LEAR INC, WILLIAM P LEAR

THANKS TO THE WONDERFUL PERFORMANCE OF YOUR L-2 AUTOPILOT, YOUR ADF-12 AUTOMATIC DIRECTION FINDER, AND YOUR VHF COMMUNICATIONS RADIO, MY FLIGHT OVER THE NORTH POLE WAS ESSENTIALLY NO DIFFERENT FROM ANY OTHER ROUTINE FLIGHT I HAVE MADE EXCEPT THAT IT TOOK A LITTLE LONGER. THE L-2 TOOK CARE OF ALL THE CRUISING FLIGHTS AND THE ADF-12 WAS EXTREMELY HELPFUL IN THE NAVIGATION BY OBTAINING LONG DISTANCE RADIO BEARINGS FROM ALASKA. I HAVE OPERATED YOUR EQUIPMENT ON MY MUSTANG UP TO 37,000 FEET AND AT TEMPERATURES OF 70 DEGREES BELOW ZERO WITH UNIFORMLY EXCELLENT RESULTS. BEST REGARDS.

CHARLIE BLAIR

From Norway to New York via the North Pole with only one stop for gas at Fairbanks, Alaska—6,750 miles in a Mustang F-51 at an average speed of 320 miles per hour—that is the historic and daring achievement of Captain Charles F. Blair, the only man ever to make such a flight solo over the top of the world. In the Arctic regions your magnetic compass is useless, so your radio direction finding aids and automatic pilot become all-important—particularly when you have to go it alone. Captain Blair, Strato cruiser pilot for Pan American World Airways and veteran of 420 Atlantic crossings, knew exactly what the

job called for. Naturally he chose Lear equipment throughout—and he was never more than one minute off his ETA's on the entire flight.

Here is the Lear equipment installed in the Mustang of Captain Blair for his remarkable flight—this in one already overcrowded F-51! It had to be compact to fit the space—it had to be good to do the job.

- 2 Lear ADF-12 Automatic Direction Finders
- 1 Lear L-2 Automatic Pilot
- 1 Lear Master Direction Indicator
- 2 Lear VHF Receivers
- 1 Lear Medium Frequency Receiver
- 2 Lear 12-channel VHF Transmitters
- 1 Lear Low Frequency Transmitter
- 1 Lear Hand-Reel and Trailing Antenna Assembly

LEAR INC. 11916 WEST PICO BLVD., LOS ANGELES 64, CALIFORNIA

